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OF POULTRY REARING

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with foresight, vision and faith

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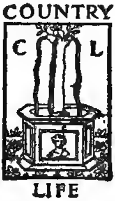
PAYNTER'S SYSTEM OF POULTRY-REARING

THE INCREASED PRODUCTIVITY SERIES

General Editor: P. Anderson Graham



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PAYNTER'S SYSTEM

OF

POULTRY-REARING

OR

£500 A YEAR FROM HENS

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INTRODUCTION

I READ through every new book on Poultry which I happen to see, and have come to the conclusion that they are as a rule much too long, and all that the public wish to be told is, in as few words and as clearly as possible, how to make eggs and table poultry pay by well-tried simple systems of feeding and general management.

Poultry-keepers may be divided up into the following groups:

1. The backyarder with perhaps from 6 to 12 birds, and who has no grass land.

2. The cottager who keeps from 12 birds upwards, and who probably has access to some grass land, either in his backyard, around his house, or by the roadside.

3. The well-to-do person who keeps a few fowls to supply eggs and table birds for his own home consumption, and which are probably looked after by some member of his family, or by his groom or gardener.

4. The small poultry-keeper, very often a station-

master, pitman, artisan, or tradesman, who may rear perhaps a hundred chickens per season, and who possibly devotes his attention to one breed only, and may thus be termed a small fancier.

5. The large fancier, who employs labour and who may make a speciality of trap-nested birds for giving a high egg yield, and who probably has many breeds, and may rear from 1000 to 10,000 chickens per season.

6. The farmer or small-holder who keeps 100 or more head of poultry running about his farm, and who looks upon them merely as an adjunct to the other branches of agriculture.

7. The small-holder who wishes to employ little or no labour, and to take up the production of table poultry and eggs as his principal means of making a living, and who looks upon the other branches of agriculture as an adjunct to his poultry.

8. The capitalist who wishes to invest his money in the production of table birds and eggs on a large commercial scale, and engages skilled labour in the hopes of making a business and obtaining a profit on his capital, possibly without having to take any active part himself in the actual work.

9. The day-old chick man, who may or may not keep his own stock birds.

To write a book so as to satisfy all these various groups is not an easy task, each group really requires a book to itself, and should be written by a person who has had at least ten years' practical experience in his group.

I have had ten years' practical experience investigating and demonstrating how to make poultry pay from the point of view of Group 7, that is, from that of a small-holder, and during these years have necessarily come into contact with many people belonging to the other groups, and therefore, although I am not fully experienced in any Group except No. 7, yet I have gathered a considerable amount of knowledge which may be interesting and useful to people in the others.

At my home in Hounslow we keep, on extensive lines, from 100 to 150 head of poultry, on about one-third of an acre of grass land, from which I gather some experience and knowledge from the point of view of people in Group 3.

All the methods I use are quite as applicable and useful to a person working on a very small scale, as to small-holders working on a scale large enough to enable them to make their living thereby.

I append hereto a copy of the letter from the Board of Agriculture and Fisheries with reference to my work at Morden and Haslington Halls in 1913, 1914, and 1915.

Board of Agriculture and Fisheries,
Whitehall Place, London, S.W.,
27th September 1915.

No. A 20382/1915.

Sir—With reference to your letter of the 18th instant, regarding the termination of your engagement when the poultry demonstration at Morden Hall is brought to a close on the 31st October next, I am directed by the President of the Board of Agriculture and Fisheries to inform you that he does not propose to arrange for a continuance of this type of work in the immediate future.

2. Lord Selborne has given careful consideration to the proposals for testing the commercial possibilities of egg-production on a large scale, as outlined in your letter of the 6th instant, and, while he is in sympathy with the objects which you have in view, he regrets that it is not possible at the present juncture to provide financial assistance through this Department in aid of the proposed experiment.

3. Under these circumstances your services will not be required after the 31st October, but the President hopes that the relationship which has been established between yourself and his Department during the past three years is such that it may be possible to count on your co-operation, if oppor-

tunity should arise, in arranging for similar demonstrations in the future.

4. Lord Selborne desires me to take this opportunity of conveying to you an expression of his appreciation of the character of the work which you have carried out during the past three years in Cheshire and Cambridgeshire. The demonstrations conducted in these counties have not only served to familiarise the small-holder with a method of rearing and management based on the result of careful experiment, but they have served as an object lesson in the use of simple and inexpensive appliances, and in a rigid economy of labour. In place of haphazard, or purely empiric methods, you have substituted a standardised system of management which is directed to simplify, and, therefore, to increase, production on the small-holding. In addition to this, the records which you have accumulated both in regard to the production of the stock, and in regard to the financial aspect of the undertaking, have supplied reliable figures of considerable value.

5. I am also to thank you for the readiness with which you undertook the increasing work and responsibility which developed on you as the scope of the demonstrations widened, involving the addition, at different periods, of a section devoted to finishing the birds in accordance with Sussex practice; of another section devoted to the main-

tenance of breeding stock, and of an extensive plant for commercial egg-production which was established on the outbreak of war.

The mere supervision of the work of all these sections was a heavy and responsible task, which called for exceptional initiative and experience. Nevertheless the results obtained in all the sections have been valuable and instructive, and the records of these results have added to the sum of reliable information available for the guidance of poultry-keepers. Apart, however, from the intrinsic value of the results obtained through your work, the President desires me to record his appreciation of the spirit in which they were achieved, viz. that of a disinterested desire on your part to further the rapid development of the industry by placing at the disposal of the small producer the exceptional experience which you possessed, and the improved methods which that experience had led you to adopt.

I am, Sir,

Your obedient servant,

T. H. MIDDLETON,
Assistant Secretary.

PAYNTER'S SYSTEM
OF
POULTRY-REARING

CHAPTER I

My Aim

SMALL-HOLDERS in the shape of ex-soldiers (even partly disabled soldiers) or sailors, ex-civil servants, etc., frequently have all the personal elements essential for success, that is capital, industry, enthusiasm, capability, health, and strength; yet in spite of this they often fail chiefly owing to lack of proper knowledge, that is a clear comprehension of what the financial possibility of their work really is, and a knowledge of the necessary appliances, methods, and ways essential to enable them to set about attaining this possibility.

In order to supply this necessary and vital information it has always been my contention that poultry and other types of small-holdings should be started on an experimental basis for the express purpose of making clean-cut commercial tests, in order first to gain the necessary knowledge, then to consolidate it, and then to publish (under guarantee of accountants' certificates) the actual profit which small-holders have made.

Such undertakings should stand by themselves, absolutely independent of collecting depots, retail trade, etc., and the whole of their produce should be disposed of on the wholesale markets.

Such experiments should only be used as commercial tests and not for ordinary educational purposes, that is pupil training, demonstrations, etc.; and when these test holdings are firmly established similar holdings, not necessarily paying holdings, might be started on identical lines for ordinary educational purposes.

If such small-holdings could once be set on foot and carried on under the most favourable working conditions, from the point of view of profit producing, with ample capital economically expended, what splendid and badly needed object lessons would be given to the country.

Such experiments would settle once and for all the vexed questions as to whether poultry-farming pure and simple and other types of similar small-holdings pay or do not pay.

Although at first it would not be possible, yet when once such holdings were organised and firmly set on foot, they should be passed on into the hands of ordinary small-holders to carry them on.

If such undertakings were started and firmly established, then people, by copying the Government pattern or gauge small-holdings, would know exactly how to invest their capital with safety, and what the financial results of capital, properly invested in poultry and other types of small-holdings, ought to be. They would also know how much capital must be invested to produce certain results, how much capital one man can easily handle himself; how much (if any) extra labour he would at odd times require; how much land is necessary, whether it is advisable to combine different branches of agriculture or not, and if so, how best to combine them; and many other debatable points.

The rearing of chickens, ducks, pigs, calves, the production of eggs and other branches of petty agriculture which are so much more adapted to small-holder working conditions than the larger branches, such as tillage, cattle, sheep, etc., are not, as some people seem to delude themselves by thinking, merely mechanical processes.

As individualistic efforts they will always yield much better financial results than when this type of work has been conducted collectively.

All practical people appreciate the fact that the personal factor, that is the individualistic effort, care, attention, and sympathy, when turned to account in these directions, will give excellent results, and therefore investigation and research ought to be made in order to ascertain into which of these minor channels of agriculture this effort can best be turned in order to produce the most profitable results.

By channels, I do not refer only to live stock, but also to the economic application of foods, systems, appliances, methods, and ways for handling them.

No matter how enthusiastic, industrious, and painstaking the individualistic effort may be, this effort in itself will not avail to produce a satisfactory financial result unless supplemented, guided, and backed up by proper knowledge and information on the above points.

Four years ago, when after eight years of investigation of the above type, my work was taken up by the Board of Agriculture and Fisheries, I believed that it was going to be fostered and developed and given every opportunity of showing the profits it was possible to make from it, when the work had been conducted for this purpose only, under the most favourable working conditions.

I expected to have a model of what one might term a poultryman's small-holding given me, and to be told to go ahead and show what profits it was possible for a small-holder, that is for a person belonging to Group No. 7, to make out of poultry when the work had been conducted by him as an individualistic effort.

Such a poultry small-holding would have had a most steadying and developing effect on the poultry industry and small-holder movement, and my idea was that when the holding was once established and had proved itself to be a sound financial success, it might then, and only then, have been used as a sort of key farm or pattern or gauge, and all poultry-farms starting with the idea of producing eggs and table poultry might have been modelled on the Government lines, and in the event of any of them going wrong, they could at once have been put right by referring to the Government's model.

The poultry industry, and also the small-holder movement, wants reducing to what one might term independent one-man efforts. I give the following as an example. I believe that by systematic working one man, with the help of one boy or girl, can turn out from £1600 to £1700 worth of eggs per year, representing approximately from 250,000 to 300,000 eggs. The land required would be five acres per year, the capital for plant and live stock from £600 to £700, and he should make a profit of about £500 per year.

If this could have been proved and the details worked out and authenticated by the Government by actual practice, and could have been continued and the results maintained, consolidated, and tabulated year after year over a number of years, it would have standardised and revolutionised the egg-production industry.

The other branches could have been standardised in much the same way, and by this means the poultry industry would have been stabilised and would have become one of real national importance, and by increasing the number of units it could have been developed to any extent all over the country.

The type of person whom I am anxious to help is a similar class of person to myself, that is, someone who has sufficient capital and who is anxious to become a small-holder or occupier of land, and to invest his or her capital with a view to making his or her living practically at once without any unnecessary beating about the bush as now (*i.e.* without having to make experiments perhaps for years for himself) on the production of eggs and table poultry, to be sold wholesale and direct through the medium of the ordinary wholesale meat markets, *i.e.* through the agency of the meat-market salesmen.

There are thousands of such people about, and after the war there will be a great many more, and at the present moment such people have little or no official encouragement or guidance whatsoever, the result being that numbers of them yearly take up poultry-farming, and frequently sooner or later come to grief and lose their money, the reason being through their lack of proper knowledge and their not being able to obtain sufficient official information and guidance as to the possibility of their being able to make a living out of poultry alone or not.

They therefore make a wrong start by investing their capital improperly.

They may engage improper labour.

They have no complete and well-tested pattern or general scheme of operations to follow.

They start work under unpractical and improper working conditions.

The situation of their holding is often too isolated for them to sell their produce to advantage.

They very frequently start the wrong branch of the work at the wrong time of the year.

They try to work against and out of the seasons instead of getting the seasons to aid and work with them.

They use too expensive foods and appliances.

They use unsuitable breeds for their locality, purpose, and method of housing and yarding.

They have an imperfect knowledge with regard to markets and marketing.

When they start operations they have no clearly defined ideas as to what is their real aim.

Instead of being absolutely independent people they depend too much upon others in the shape of collecting depots, etc.

Instead of concentrating on one branch they take up too many or amalgamate it with other branches of poultry, agriculture, or horticulture, which are unsuitable for such combination purposes.

As an example of this last clause : For the season of 1915 I was asked by the Board of Agriculture and Fisheries to make four separate experiments :

No. 1. To keep about a thousand pullets for egg-production on two and a half acres of land.
No. 2. To keep about a hundred and fifty stock birds for stock eggs on about one acre of land.
No. 3. To fatten six dozen chickens per week.
No. 4. To attempt to rear four thousand chickens to killing size per season on three acres of land.

Had I concentrated the whole of my time and efforts entirely on No. 4, which was my original intention, I probably would have made a substantial profit out of it alone. As it was, however, the success of this experiment was in a great measure sacrificed for the sake of the others.

My experiences have proved to me that it is wrong to attempt too many branches at one time on one holding, and one must be very careful about combinations, because when one is depending mainly upon one's own individual effort so much of the work of each department has to be done daily day after day without ceasing, at the same time, that it is much better to increase one's output on the one branch that one thoroughly grasps and understands, and has organised so as to make profitable and comparatively easy by much practice, than to take up several in the hope that by combination better profits may be obtained. My idea as to the secret of success in poultry work lies in concentrating one's efforts on one particular branch, doing a sufficient quantity of it to ensure one's living after covering the expenses of one's necessary standing charges, and leaving the other branches severely alone, or, in other words, simplicity of operation is to be the watchword to success.

My ideal plan would be to have had a colony of small-holders, each man specialising in one particular branch, and as far as possible working into each other's hands. For instance, I would have :

(1) A small-holder on from 11 to 16 acres of land, according to its nature, with 2000 laying pullets.

(2) Another small-holder with 2000 stock birds or 1000 stock birds and 1000 pullets on the same area of land.

(3) Another rearing about 4000 chickens per year on 13 acres of land.

(4) Another fatting, say, 200 birds per week. He would practically require no land.

Each man would act independently, but would, as far as possible, buy from his neighbour as follows :

No. 1 would buy his pullets from the Rearer No. 3; No. 2 would buy his hens in their second year from the Pullet man No. 1; No. 4 would buy the cockerels from the Rearer No. 3; and No. 3 would buy his eggs from the Stock Bird man, No. 2.

The Board of Agriculture do not seem to wish to encourage such people, as they appear to be not quite certain that they can safely be relied upon to make a living; but I do wish to encourage them, because of the fact that I have sufficient practical experience behind me (ten years entirely devoted to the one object) to grasp the fact that this class of person when they start almost invariably go wrong, not because their desire to make a living by this means is impracticable, but because they have no really authentic commercially successful patterns to follow, and because they have no practical people who have themselves been able to actually make their living as individual workers out of such undertakings, to guide them how to start right and keep right, and to help them to steer clear of the many pitfalls and difficulties which bestrew their paths.

I first took a serious interest in poultry in 1902.

At that time I was an aeronautical engineer in London. Aeronautics were then in their infancy, and as things were slack I made up my mind to go out into the country and try to make my living out of the production of eggs and table poultry, and although I made the fullest enquiries, yet I found that there were no successful patterns to follow, and no one who could give me helpful, encouraging, and proper advice. *It must not be forgotten that this is a most important branch of agriculture, and, in fact, is about the sixth item on its programme, and of our food supply.*

After spending many months and a considerable sum of money on tuition, etc., I gave it up as hopeless, and returned to London and went on with my profession. In 1905 I decided to give up my profession in order to make a series of practical experiments and investigations to discover, if possible, why eggs and table poultry could not be produced on a paying scale in sufficiently large quantities to enable an industrious small-holder or other person to make his or her living thereby with certainty. I give below the dates and localities of these experiments:

1906 and 1907.—Isolated myself on the Farne Islands off the Northumberland coast. The 1906 results were published by Messrs. Cassell in book form, and the 1907 results by *Country Life* in one of their articles.

1908.—An experiment made in Alnwick Park, under the aegis of His Grace the Duke of Northumberland, who appointed a special Committee of Investigation, on which was Professor Gilchrist of the Durham College of Science, who represented the Board of Agriculture. These results were immediately submitted to the Board of Agriculture, but have not up to now been published by them.

1909, 1910, and 1911.—Experiments made on a seventy-acre small-holding in Hampshire in co-operation with the *Daily Mail.*

1912.—Table poultry production experiment at Heston Hounslow. This experiment was watched by the Board of Agriculture, and the results published in their *Journal* of December 1912.

1913.—Table poultry production experiment at Haslington Hall, Crewe, in Cheshire, for the Board of Agriculture and Fisheries. These results were published in their *Journal* of March 1914.

1914.—Fatting and Table poultry experiment for the Board of Agriculture and Fisheries, at Morden Hall near Cambridge, the results of which were published by them in their *Journal* of April 1915.

1915.—Egg Production, Table Poultry, Fatting, and Stock Bird experiments made for the Board of Agriculture and Fisheries at Morden Hall near Cambridge. Partial results of the egg-production experiment were published by them in their *Journal* of July 1915, and the results of the Fatting and Table Poultry experiments in their *Journal*[1] of September 1916.

Ten times I have started out, so to speak, at the bottom of the ladder—that is, with a bare field and no live stock—and worked up through all the stages to a point when I have sold off everything; and thus, by covering the same ground time after time and year after year in different parts of the country and under different working conditions, I have obtained a grasp and mastery over the subject.

During my journeys up and down the country I have come into contact with thousands of people interested in the subject, all classes and kinds, big farmers, small-holders, etc., etc. I have lived for six years among small-holders, working among them as a small-holder, and therefore I know that commercial tests to act as examples *are badly wanted*, and it was because of the need of such experiments that I could not make my living as a small-holder years ago, and because of the need of such official guidance that thousands of industrious people are being ruined to-day.

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[1] Copies of the Board's *Journal* can be obtained from the Board of Agriculture and Fisheries, 4 Whitehall Place, S.W. Price 4d. each, post free.

EXPERIMENT No. I[1]

BALANCE SHEET OF MY SMALL-HOLDING EXPERIMENT MADE WITH ABOUT 1000 LAYING PULLETS AT MORDEN HALL, NEAR CAMBRIDGE, IN 1915

Dr.

				Approximate Cost per dozen Eggs.		
Food . . .	£341	0	0	10.07d.	or	10d.
Commission . .	29	0	0	.85d.	,,	⅞d.
Carriage . . .	28	0	0	.83d.	,,	¾d.
Labour . . .	50	0	0	1.47d.	,,	1½d.
Depreciation on plant . . .	15	0	0	.45d.	,,	½d.
Interest on capital	15	0	0	.45d.	,,	½d.
Rent, rates, and taxes . . .	5	0	0	.15d.	,,	⅛d.
Miscellaneous expenses . . .	5	0	0	.15d.	,,	⅛d.
Oil and coal . .	3	0	0	.09d.	,,	⅛d.
	£491	0	0	14.51d.	,,	1s. 2½d.
Profit . . .	129	0	0	4.02d.	,,	4d.
	£620	0	0	18.53d.	,,	1s. 6½d.

Cr.

				Realised per dozen approximately.		
96,358 eggs produced 8029 doz. realised . .	£615	0	0	18.38d.	or	1s. 6⅜d.
Manure . . .	5	0	0	.15d.	,,	⅛d.
	£620	0	0	18.53d.	or	1s. 6½d.

The profit to a Small-holder, that is to a man doing the work himself, would have been: Profit, as above, £129; his own labour, £50; the interest on his own capital, £15; total, £194. A Small-holder, working on the plan adopted at Morden Hall, and devoting his whole time to this kind of work, with the help of a boy, should be able to look after twice this number of birds, *i.e.* 2000. All the eggs were sold at wholesale market prices in London.

---

[1] The figures for all these experiments were kindly supplied by the Board of Agriculture and Fisheries.

CHAPTER II

Small-holder Poultry Experiments in 1915

EXPERIMENT NO. 1

About a thousand laying pullets for commercial egg-production on 2½ acres of land.

THIS experiment was designed by me and based on a number of experiments made whilst working with the *Daily Mail* during 1909, 1910, and 1911.

Practically all the eggs were sold through Mr. C. E. Brookes on the wholesale meat market at Smithfield; the few that were sold otherwise were charged up at the current wholesale market prices.

I have made no charge for carting to the station, because this is a variable charge which depends upon the situation of the holding. At Hounslow and Alnwick I was within the railway company's collecting radius, and the charge therefore at these places did not exist. In an ordinary way one should be able to arrange to have one's eggs taken to the station by a milk cart. At Morden Hall they were run up by the dog-cart with other produce.

One pony delivery van with one journey per day could take to the station the produce of several holdings. Morden Hall was four miles from a railway station.

A small-holder's income, doing the above work himself would thus have been:

Net profit, as above	£129
Labour (his own)	50
Interest (his own capital)	15
	£194

The area used was 2½ acres, and the capital:

For live stock	£150
For plant	150
	£300

For laying hens no special design of holding is necessary, all that is required is a dry field, and for 2000 laying birds about 15 acres; 5 acres of fresh land should be used for the poultry every year, and the 10 acres not in use could either be mown, fed off with young stock, or used for cows or other purposes. At Morden Hall the land on which the poultry had been running during the previous year more than doubled its hay crop.

Feeding, watering, picking up eggs, cleaning houses, etc., necessitated about an average of 4½ hours per day of a man's time, with about 3 hours of a boy's, and I estimate that 2000 laying hens would require about 7 hours of a man's time per day, together with the assistance of about an equal number of hours of a boy's.

The birds used during 1915 were not bred for egg-production, and were all late hatched; that is, they were hatched in May and June of 1914, and were mostly heavy breeds, such as Sussex, Faverolles, Orpingtons, Brahmas, Rocks, etc., etc., with a few Wyandottes and Rhode Islands.

Owing to the birds being hatched late in the season comparatively few eggs were laid before January, and I received instructions from the Board of Agriculture to commence selling off the live stock in June, so that the results produced represented not more than 10 months' work, and the most profitable months of the year were lost.

No charge has been made for depreciation on the live stock, because when they were taken over they weighed from 3½ to 4 lbs., and were estimated to be worth about 3s. each. When sold they averaged about 6 lbs. and, being sold early in the season, before game was on the market, they realised considerably more than they cost. There is no reason why in normal times they should not realise at least their primary cost, provided a heavy type of bird is used, and they are fat, properly marketed, weighing about 6 lbs., and from 17 to 18 months old.

My method of housing and system of running, to which the success of this experiment was mainly due, was worked out by me during the time I was with the *Daily Mail* in 1909, 1910, and 1911. During this period I tried a very large number of types of houses in competition with one another, and came to the conclusion that the Sussex Ark type, which I now use, was, for small-holders and others working on extensive lines, much the best; and I believe its adaptation for general use will in time revolutionise the egg-production industry of this country.

This house, which is about 9 feet long, 2½ feet wide, and 3 feet high, can easily be constructed by any one who has any experience of carpenter's tools, and sufficient timber to make one could be bought before the war at a cost of 17s. 6d.; or any carpenter would make one up for 27s. 6d. They give accommodation for 25 laying hens. I have absolutely no interest in recommending this type of house beyond the fact that after many years of practical investigation I have formed the conclusion that they are the best for all-round commercial purposes.

During the three years I was with the *Daily Mail* we made an enormous number of experiments in connection with houses, foster-mothers, and incubators at great expense and trouble, and it is mainly this ground work which gives me the great confidence I now have in this work.

Before I came to the *Daily Mail* I had spent most of my time in experimenting with foods, but found, when starting to work on a large commercial scale, that the housing question was quite as important as that of food, breeds, or strains, and therefore it was necessary for me to set out on a fresh series of investigations; and now, owing to the favourable results obtained by means of the plant at Haslington and Morden Halls, the Board of Agriculture fully realises the importance of this side of the question, and intend to investigate and develop along these lines.

As last season was drawing to a close I sketched out for the Board of Agriculture a scheme of development, and asked them to let me rear 2000 pullets, so that these would all come into lay three months earlier than was the case in the previous season (this in order to obtain the high prices ruling in October, November, and December). I intended to run these birds through to September 1917, when they would be all sold off for killing purposes. Such an undertaking would have been just sufficient to keep a small-holder fully employed. The land necessary would have been 5 acres per year, the capital required about £700, £600 for live stock and appliances, and £100 for sundry expenses; and the birds would have produced from 250,000 to 300,000 eggs. The value of these eggs would have been about £1800; that is, we would have produced a turnover to the small-holder to the value of about £360 per acre, and have at the same time greatly improved his land. The profit to him from this source alone would probably have been about £500 per year, *i.e.* £100 per acre.

SMALL-HOLDER FATTING BIRD EXPERIMENT COVERING 19 WEEKS, MADE AT MORDEN HALL IN 1915, FATTING 72 BIRDS PER WEEK

Dr.

	£	s.	d.	Cost per Bird approximately.	
1178 lean birds weighing about 4 lb. each cost	£190	14	6	39.10d. or	3s. 3¼d.
Food consumed	35	15	0	7.33d. ,,	7¼d.
Labour	33	15	7	6.94d. ,,	7d.
Salesman's commission	14	12	3	2.96d. ,,	3d.
Railway carriage and cartage	13	11	4	2.80d. ,,	2¾d.
Rent, rates, and taxes	2	0	0	.33d. ,,	¼d.
Interest on capital	2	5	0	.48d. ,,	½d.
Miscellaneous expenses	1	6	8	.29d. ,,	¼d.
Depreciation on plant	1	7	3	.30d. ,,	¼d.
	£295	7	7	60.53d. ,,	5s. 0½d.
Net Profit	8	13	0	1.78d. ,,	2d.
	£304	0	7	62.31d. ,,	5s. 2½d.

Cr.

	£	s.	d.	Realised approximately per bird.	
1171 birds weighing about 5 lb. each sold for	£300	15	9	61.66d. or	5s. 1½d.
Manure sold for	1	13	0	.33d. ,,	½d.
Feathers sold for	1	11	10	.32d. ,,	½d.
	£304	0	7	62.31d. ,,	5s. 2½d

One thousand one hundred and seventy-eight birds were put up for fatting, but 7 were lost by death, theft, etc. Th cost per bird has been worked out on the actual birds sold, namely 1171.

The profit to a Small-holder, that is to a man doing the work himself, would have been: Profit, as above, £8 : 13s. his time, £33 : 15 : 7; interest on his own capital, £2 : 5s. Total, £44 : 13 : 7 for 19 weeks, *i.e.* £2 : 7s. per week's work, bu a skilled man should be able to fat at least twice the above number per week.

EXPERIMENT NO. 2

Cramming about 72 birds per week.

This experiment was also of an original and novel character, and in its way was quite as successful and important as that of the thousand laying pullets. It was designed and based upon observations made by me during my experiments in 1914.

When with the *Daily Mail* during 1909, 1910, 1911 I made several fatting investigations.

All the birds were sold on the wholesale meat-market at Smithfield, London.

The 1171 birds sold cost £295 : 7 : 7, or 5s. ¾d. each to produce, and realised £304 : 0 : 7, or 5s. 2½d. each; leaving a net profit of £8 : 13s. or 1⅜d. per bird.

The actual profit to a small-holder (that is to a man working for himself) would have been as below:

Labour (his own)	£33	15	7
Interest on capital (his own) . .	2	5	0
Net profit	8	13	0
	£44	13	7

As the experiment covered nineteen weeks this represented to the worker an income of £2 : 7s. per week. His output was 72 birds per week, and as these birds were put up for fatting for two weeks instead of from three to three and a half, as is customary, one man with the assistance of some one to help him to stubb—that is, to pick out the small feathers—should easily be able to turn out from twice to three times this number. Taking it as twice, then his income would be £4 : 14s. per week, less stubbing 144 birds at ½d. say 6s.; or £4 : 8s. per week left for the small-holder's labour.

The capital necessary would be:

	£	s.	d.
432 birds at a maximum cost of 3s. 6d. each (in normal times)	£75	0	0
Plant, food, etc.	35	0	0
	£110	0	0

He would require a small cottage (of no special design) with about an eighth of an acre of land, his main difficulty would be a supply of suitable chickens; but this could be overcome by having a colony of small-holders working into each other's hands, as explained in Chapter I.

EXPERIMENT NO. 3

130 *hens to produce hatchable eggs for incubators.*

In order to make this experiment as valuable and comprehensive as possible the Board of Agriculture supplied nine different patterns of houses, their object being to ascertain whether any of them showed any decided advantages over the Sussex Ark.

These houses cost 27s. 6d. each, and accommodated 25 laying fowls. The other houses cost from £4 to, I believe, £8 or £9 each, and would not accommodate so many birds, except in one case, which I believe was designed for 25.

Before this experiment started I told the Board that I had already gone over similar ground years ago when with the *Daily Mail*, and had fully decided in my own mind which was the best commercial type of house for extensive poultry keeping. They, however, wished the experiment to be made, and the result was that the Sussex Ark came out much the best: they cost less than one-quarter the price of the others per bird housed; the birds laid quite as many eggs, and were healthier and better in every way. As I have already stated, when with the *Daily Mail* we spent a very large sum of money over this investigation, and time after time I went down to Sussex and to other counties in order to examine different types and different methods of housing. I believe this experiment quite convinced the Board; and I feel sure that the general recommendation by them of this type of house to smallholders and others for extensive poultry keeping will in time revolutionise the egg-production industry of this country. As already stated, these houses before the war could be made by any handy man at a cost for wood of about 17s. 6d. each.

From the point of view of housing this experiment was most instructive. The birds produced 8974 eggs, that is, 748 dozen at a cost of £61 : 6 : 3 for food and all charges, including cost of cockerels' keep. Each hen, therefore, produced during the season about 69 eggs, at a cost of 1s. 7¾d. per dozen. Had these eggs been sold for hatching purposes at 2s. per dozen, then there would have been a profit of £13 : 4 : 11, or about 1s. 10d. per bird. Had they been sold at 2s. 6d. per dozen, then there would have been a profit of £31 : 18 : 11, or 4s. 3d. per bird for the breeding season.

There was no charge made for depreciation on the birds, because these were bought in or taken over at prices ranging from 2s. 6d. to 5s. each, and sold for as much as they originally cost.

No special design of cottage is required for such a small-holding effort, but, as in the case of the 1000 laying pullets, a dry field is essential. For 1000 stock birds 5 acres would be required per year, and the cost for plant in normal times would be about £300. Probably the total cost with live stock, food, etc., would be not much short of £600, and the financial result about the same as that of 1000 laying pullets kept for commercial egg-production; but such a plant would require more land, skill, and experience, and would be much more difficult to manage.

EXPERIMENT NO. 4

An attempt to rear about 4000 *chickens for table purposes up to killing size* (4 *lbs.*) *and age.*

Chicken-rearing is much the most difficult of the branches. To rear by tens is not the same as rearing by hundreds, or hundreds as by thousands; by this I mean that different rearing appliances and methods are necessary in each case. Foster-mothers, etc., which may be the best when working on a small scale, would not be the best when working on a large commercial scale, and it is only by years of experience that this fact can be properly realised. The test of a foster-mother for rearing in large quantities is to have, say, 30 of them in an open exposed field, and then to rear chickens in them from December to July, so that the foster-mothers have to meet, without shelter, every variety of weather from a blizzard in February to a blazing sun in July.

When working with the *Daily Mail* we were on the summit of what I believe is the highest point in Hampshire, absolutely without shelter on a storm-swept brow of a hill; and as we kept on rearing right through the summer and winter months, the experiences I there gained were educational but heart-breaking. The foster-mothers I had formerly used, and which had given the most excellent results in sheltered spots, were here quite useless; and I had therefore to set to work to experiment and try other systems and makes.

I have come to the conclusion that in order to make a successful small-holder chicken-rearing demonstration, from the point of view of profit and loss, it is best to have a specially designed cottage and holding for the purpose, because when one is attempting to rear thousands of chickens over an extended period of time, one must have every convenience for doing so close at home. It is a very different thing rearing chickens in tens to rearing them in hundreds and hundreds to thousands, and when rearing on a large scale, it is most important to have the little chickens during the first few weeks of their lives under the closest observation. Therefore, the cottage should be right on the rearing ground; or, in other words, there should be a plot of grass land for rearing purposes immediately in front of the house, and, if possible, coming right up to the front door and windows. And although to the inexperienced this may appear to be a trivial matter, yet in my opinion this fact alone, in conjunction with proper foster-mothers and houses, makes all the differences between success and non-success; that is, between profit and loss.

For two years on the Farne Islands I had these conditions, and my mortality there was practically nil, also at Alnwick and at my house in Hounslow. At Hounslow, however, the conditions were not quite as described, but my house there being practically within the town there were no hawks, crows, stoats, weasels, rats, etc., and therefore it was not as important or as necessary to have the little chickens under such close observation as when working in the country.

During my three years with the Board the main rearing fields have been quite a distance from the house, and the mortality among the little chickens, owing to the depredation of hawks, crows, stoats, weasels, rats, etc., was considerable. Moreover, owing to there being many visitors to attend to, a great many of the chickens were lost through becoming chilled or overheated, caused by the division of labour and consequent lack of attention. Therefore, as the rearing results were seriously distorted by the handicapping conditions (visitors, demonstrations, divided labour, insufficient land, distance from station, etc.), it is sufficient to say that after the rent and all charges had been paid for, there was only the sum of £34 left for the small-holders' labour and interest on his capital; in 1914 the balance was £96; in 1913, £73; and in 1912, £93. Neither Morden Hall nor Haslington Hall was selected by the Board of Agriculture and Fisheries with the idea of producing successful financial results, but because they were considered by the Local Authorities to be convenient centres for giving weekly demonstrations (lectures) to small-holders and others in their counties.

Rearing in large numbers, if conducted under proper working conditions, is quite as satisfactory a branch as any of the others, though not as profitable as egg-production, in proportion to the capital invested, and I have quite as much confidence in it; but, in order that a small-holder may carry it on successfully from the profit-and-loss point of view, *i.e.* so as to make a satisfactory income of say £200 per year from it alone, it is imperative that he should have suitable working conditions, selected for him with the object of profit production, and be left quietly alone without visitors and distraction otherwise than what a man would have under ordinary small-holder working conditions. And although one may at times find a suitable cottage in the middle of a field, or adjoining a suitable, fairly level, dry field, it is not by any means easy for an ordinary person to do so, and therefore much the best plan is for County Councils to select special land and situation and erect special cottages for the purpose.

Both Morden Hall and Haslington, where I conducted my experiments for the Government, were old farm-places, near water, and were infested with rats. By building a new cottage on an open field and taking proper precautions, rats can be kept down, or at least under sufficient control.

No. 1 Experiment clearly showed the possibilities that exist for egg-production in connection with land settlement, for ex-soldiers and others, and that the possibility of such a small-holder making his living by such means depends more upon the situation of the holding and upon the selection of proper poultry houses, foods, and general management than upon that of improved laying strains and high-class stock; also that one man with a little help, on a capital of about £600, can quite easily handle 2000 laying birds, and make a profit on them in normal times of about £500 per year.

No. 2 Experiment proved the possibilities of using the fatting branch of the poultry industry for land settlement purposes, provided there is an assured supply of lean chickens at reasonable prices. This can be brought about by having a colony of small-holders working into each other's hands, as explained in Chapter I.

No. 3 Experiment proved that it is possible in normal times to successfully house laying birds on extensive lines at a cost of about 1s. per head, instead of, as is sometimes the case, £1; and that, taking into account wire-netting, feeding utensils, etc., the plant charge need not be greater than 2s. 6d. per head.

No. 4 Experiment proved that for chicken-rearing on a large commercial scale for table-bird purposes, that is, on a scale large enough to support a small-holder and his family, it is best for him to have a cottage specially built on a specially designed holding, within a reasonable distance of a railway station, say, one mile, and if possible (so as to get a low railway rate) within thirty miles of his prospective marketing centre.

Haslington Hall was 3½ miles from the railway station, which was 160 miles from where the birds were sold, and Morden Hall 4 miles from the station and 41 from where they were sold.

HISTORY OF THE SPECIAL HOUSE MENTIONED BY ME, WHICH PROVED THE BEST FOR ALL-ROUND PURPOSES.

Before starting in co-operation with the *Daily Mail*, 1909, 1910, and 1911, I had already done four years of investigation work, during which time I had formed the opinion that for all-round commercial purposes a certain type of house was the best. I therefore commenced operations with this house, but the situation of the holding being most exposed I found that the type of house to which I had pinned my faith was, under such exposed conditions, for commercial purposes practically useless. I therefore had to discard it, and in its place bought several types from various manufacturers, but not being altogether satisfied with them I then bought timber and set to work to make up houses to various designs, and being still dissatisfied I purchased from Sussex an ordinary Sussex night ark, and after comparing and carefully watching the results over several months, I came to the conclusion that the best all-round commercial results were obtained from this ark. I therefore purchased another of a slightly different pattern, and later on a third. By the end of three years I had definitely come to the conclusion that for all-round, practical, commercial purposes the night ark principle was the best, and therefore, when I commenced operations at Hounslow in 1912 I discarded all other types in favour of this one, and since then, from time to time, have added a few alterations and improvements of my own.

CHAPTER III

Egg Production

In August 1914 there were about 1200 pullets among the table chickens at Morden Hall, the remainder of the stock being cockerels. As the birds were sold off in weekly batches when they reached the age of 12 to 16 weeks, none of these pullets were hatched prior to May 1, 1914, and the greater number of them were hatched subsequent to the middle of May. A fairly large proportion were pure bred birds of the following breeds of varieties. Light and speckled Sussex, Faverolles, White Wyandotte, White and Buff Orpingtons, and Rhode Island Red. In addition there were some First crosses and a few mongrels.

Although these birds were not in any sense promising for egg-production, as they were hatched late in the spring, and were largely of the table or general purpose type, having been reared with a view to the production of flesh, it was felt, however, that they nevertheless constituted the potential source of a very considerable egg-supply, and would give me an opportunity of making an interesting demonstration of a new system of housing and yarding laying hens, which I had some time previously brought before the notice of the Board of Agriculture and Fisheries, and which I was very anxious for them to try. The principal feature of this new system was to substitute Sussex Arks in the place of ordinary box type poultry houses, with a cheap and portable system of runs so arranged that the labour of feeding, cleaning, and general management was reduced to a minimum. In the middle of August it was decided to make a selection of the birds in order to retain about 1000 of the best pullets for this experiment.

Each ark cost 27s. 6d. and accommodated 25 birds. Separate nest-boxes were provided which were placed behind the arks, the runs averaged 30 yards by 9 yards, and were erected on a fresh piece of about 2½ acres of light dry grass-land, where a certain amount of protection from the wind was afforded by a hedge.

The runs were constructed of 4-foot wire-netting, 2-inch mesh and chestnut or hazel posts which cost about ¾d. each. They were arranged on the four sides of a rough rectangle, with paths which gave facilities for feeding and for the collection of the eggs; no gates were used, and access was gained to the runs by placing one movable post, which was loosely fixed in the ground next to a fixed post, and attached to it at the top by a stout wire ring which could be slipped over the top of the post at will (see page 152). When the ring was removed an entrance was obtained between the two posts. The forty runs necessary to accommodate the pullets were erected by myself and an assistant without any further help, and they were completed for the reception of the pullets early in October 1914. The Arks were placed in them, and in order to prevent the ground below the house becoming foul, and to preserve part of the manure, a dropping-board with slightly sloping sides was slipped below the slatted bottoms of each Ark.

The total cost of providing forty houses, nest-boxes, dropping-boards, water- and grit-pans, food-tins, wire-netting, and posts, including sundries, amounted to £120 : 11 : 4. The cost of housing was therefore about 2s. 5d. per bird.

A thousand and sixteen pullets were selected, and the laying stock was divided into flocks of 25, each of which was placed in a separate run. Of the pullets originally selected, 61 were subsequently killed for consumption, and a few deaths occurred from ovarian troubles.

METHOD OF FEEDING

A round quart measure was cut down so that it just comfortably held 1 lb. of meat scrap, and this measure was then used for measuring out the various ingredients as below—

1 measure of meat scrap,
2 measures of biscuit dust,
4 measures of bran.

These were placed in a galvanised bath measuring 36 inches long, and on this mixture was thrown 1½ gallons of boiling water, the whole then being well mixed together into a thick paste by means of a long iron spoon. On it was then thrown 8 lbs. of the best sharps (called, in some districts, dan, seconds, or middlings), and in order to keep in the steam this meal was spread as evenly as possible over the whole surface of the paste, then after being allowed to stand for about ten minutes the whole mixture was thoroughly mixed together by hand.

This food was fed to the birds in suitable feeding-tins between 7 and 8 A.M., and after half an hour any left over was picked up, and the birds had nothing more given them until their evening meal between 6 and 7 P.M., or, when the days were short, one hour before sunset. They were then fed with as much of the following corn mixture as they would eat—

1 part oats,
1 part maize,

or, as a change,

1 part oats,
1 part maize,
1 part wheat.

This was fed to them in tins so designed that it could not be scratched out, and any left over was picked up after the birds had gone to roost.

They were always supplied with ample quantities of grit and oyster shell and with clean water. No green food other than that obtainable on the runs was given to the birds.

The eggs were collected mainly in the afternoon.

The houses and nest-boxes were regularly cleaned, and the management, while systematic and careful, did not provide for any coddling.

The eggs were weighed and counted, and any exceptionally small or ill-formed specimens were removed, the remainder being despatched to London and sold on commission through a large wholesale firm. The eggs were always despatched within twenty-four hours of the date of laying.

The final results are given on pp. 41-3, and showed a profit to the small-holder, as a return for his labour and interest on his own capital, of £194. The area of the land used was 2½ acres, and the total capital required considerably under £300.

I received little encouragement when I proposed to house pullets for egg-production in Sussex Arks through the winter with no scratching sheds or other means of shelter. It was predicted that the results would be anything but satisfactory. The winter and spring of 1915 were characterised by heavy and continuous rains and by cold winds; and these conditions were calculated to test this method of housing severely. The results indicate that the Sussex Ark type of house has a wide sphere of usefulness, in addition to the marked advantages of mobility and cheapness.

When the cost of housing and running these birds is compared with the cost under other systems involving the closed runs, it will be found both inexpensive and possessed of great advantages in the ease with which the equipment can be moved to fresh ground and re-erected.

By using this system of housing and yarding I estimate that a small-holder, with the assistance of a boy, can quite easily handle 2000 laying birds, the profit per year on which should be about £500.

The plant necessary for such an undertaking would be as follows :

Pre-War Prices

80 houses at 27s. 6d. each . .	£110	0	0
80 nest-boxes at 5s. each . .	20	0	0
80 dropping-boards at 5s. each .	20	0	0
80 broody-coops at 5s. each . .	20	0	0
80 water-tins at 6½d. each . .	2	3	4
80 grit-tins at 9d. each . . .	3	0	0
80 food-tins at 6d. each . .	2	0	0
1600 posts at ¾d. each . . .	5	0	0
80 rolls of netting, 4 feet × 2 inch × 19 gauge at 9s. 6d. . . .	38	0	0
Miscellaneous, such as egg-boxes, water-cart, water-heater, carriage, etc.	79	16	8
	£300	0	0

The 2000 pullets should cost the small-holder not more than 3s. each, that is another £300, or £600 in all.

These birds, if hatched out at the right time of the year, might be confidently expected to yield an average of from 130 to 150 eggs each by the following September, that is, from 260,000 to 300,000 eggs, the sale of which should leave him a profit of about £500 per year to pay for his labour and the interest on his capital.

The land required would be 16 acres—1 acre for the house, garden, etc., and three 5-acre plots, one plot to be used for the poultry each successive year.

The renewal of his pullets each year might not be quite easy to arrange for, and to do this he would be obliged to have a double set of houses and runs which would considerably increase the capital outlay.

If he decided to do this then he would fill up the duplicate set of runs about July, and these pullets should then begin to come into lay about the time the old hens were being marketed, or, as an alternative method, which probably would be the better, only half of his birds might be marketed yearly. This would considerably reduce the trouble and remove the necessity of extra capital, as the arks, as emptied, could be removed to the fresh ground and filled up with the 1000 young birds as the old ones were sold off and the young ones come along. The second season birds would then be mated up and used in the following year for producing hatching eggs. This probably would be a small-holder's best plan.

The ten acres of land not in use for the poultry would be mown or fed off.

The most suitable hens for egg-production, to be used in conjunction with this method of housing, yarding, and feeding, are Wyandottes, Rhode Island Reds, Faverolles, and Orpingtons.

As stated, I estimate that one man and a boy can easily look after 80 houses, each house containing 25 birds, that is, 2000 laying birds.

Many people, however, will not have sufficient capital or land to work on such a large scale, and for their guidance I give the total cost of 1 house containing 25 birds, that is, 1 unit of 25 birds.

Pre-War Prices

House at 27s. 6d.	£1	7	6	
Dropping-board	0	5	0	
Nest-boxes	0	5	0	
Broody coop	0	5	0	
Roll of wire-netting (4 ft.)	0	9	6	
Water-, food-, and grit-tins	0	1	9	
Posts	0	1	6	
Miscellaneous, egg-boxes, water-heater, cleaning utensils, etc.	1	3	0	
Total	£3	18	3	or 3s. 1½d. per bird.
25 birds at 3s. each	3	15	0	,, 3s. 0d. ,,
Total cost per unit of 25 hens	£7	13	3	,, 6s. 1½d. ,,

A hundred birds should therefore cost—100 @ 6s. 1½d. = £30 : 12 : 6.

Twenty-five birds in their first year should produce from 3500 to 4000 eggs, and if properly managed their profit, representing the balance left after paying for food and other charges, as interest on capital and remuneration for labour, should not be less than £6 : 5s. per house per year, *i.e.* 5s. per bird.

£100 should thus provide 13 houses and produce a profit to the worker of about £80 per year.

The land required will be 117 yards × 9 yards, *i.e.* 13 runs, 9 yards wide by 30 yards deep, or about ¾ of an acre.

Approximate estimate of capital, etc., required, and financial results which may be expected from the individualistic effort when applied to egg-production.

Pre-War Conditions

Capital.	Number of Houses which this Capital will provide.	Number of Birds at 25 in House.	Profit to the Small-holder for his Labour and Interest on Capital, approx.	Land required per Year. Acres.
£100	13	325	£80	¾
200	26	650	160	1½
300	39	975	240	2¼
400	52	1300	320	3
500	65	1625	400	3¾
600	78	1950	480	4½

Capital, Turnover, and Profit

Two thousand laying birds will just about keep a man and boy fully employed.

An article on my Egg-Production experiment at Morden Hall in 1915 appeared in the *Journal* of the Board of Agriculture and Fisheries for July 1915, copies of which giving particulars can be had by application to the Secretary of the Board of Agriculture and Fisheries, 4 Whitehall Place, S.W., price 4d. each, post free.

Date of Issue, July 1915	Capital.	Turnover.	Profit.
Giving particulars of my Egg-production experiment at Morden Hall in 1914 with 1000 laying pullets. The above covered ten months' work, but a Small-holder with the assistance of a boy should be able to do at least twice this number	£300	£620	£194

See Balance-Sheet, Chapter II. page 14.

Egg Production

WEEKLY RECORD OF THE MORDEN HALL EGG-PRODUCTION EXPERIMENT MADE DURING 1915 WITH ABOUT 1000 LAYING PULLETS.

Date.	Number of Eggs produced during the Week.	Eggs produced during the Week sold at Smithfield Wholesale Meat Market, London, for	Food eaten during the Week cost
Nov. 6	308	£1 16 2	£6 15 0
,, 13	439	3 18 4	7 12 6
,, 20	524	4 12 3	6 1 10
,, 27	618	5 4 3	7 0 6
Dec. 4	742	6 5 1	6 14 0
,, 11	935	8 7 11	7 6 0
,, 18	1191	11 4 3	7 4 7
,, 25	1384	9 8 11	7 1 0
Jan. 1	1487	17 2 6	7 5 8
,, 8	1758	15 5 6	6 13 4
,, 15	2051	15 10 5	6 19 10
,, 22	2280	17 13 3	6 19 10
,, 29	2403	16 15 10	8 15 10
Feb. 5	2246	15 16 0	7 14 7
,, 12	2371	16 5 11	7 14 7
,, 19	2568	18 0 11	8 5 8
,, 26	2948	20 7 9	8 12 3
Mar. 5	3208	21 1 0	9 14 2
,, 12	3463	18 8 3	9 10 10
,, 19	3519	19 16 8	8 19 3
,, 26	3544	17 6 1	8 11 6
Apr. 2	3564	15 13 11	8 6 7
,, 9	3418	14 18 1	8 5 2
,, 16	3457	18 12 5	8 2 11
,, 23	3640	17 9 5	8 17 1
,, 30	3249	17 16 9	8 18 3
May 7	3022	15 1 11	8 12 8
,, 14	2820	14 10 5	8 9 6
,, 21	2628	14 8 8	8 12 0
,, 28	2741	14 11 2	7 15 4

Morden Hall Record

Date.	Number of Eggs produced during the Week.	Eggs produced during the Week sold at Smithfield Wholesale Meat Market, London, for	Food eaten during the Week cost
June 4	2619	£16 10 11	£8 3 7
" 11	2372	13 11 2	8 15 5
" 18	2232	15 19 0	8 7 5
" 25	2247	16 0 10	8 4 6
July 2[1]	2331	16 13 0	8 1 4
" 9	2338	16 18 10	8 17 7
" 16	1986	13 12 1	8 6 7
" 23	1785	12 15 5	7 13 5
" 30	1906	13 0 7	6 9 4
Aug. 6	1686	13 4 8	5 6 4
" 13	1428	9 13 10	5 10 7
" 20	1444	10 14 1	4 12 2
" 27	1148	7 1 8	4 3 2
Sept. 3	866	7 2 9	3 4 7
" 10	590	5 4 10	3 4 7
" 17[2]	318	3 2 0	1 13 2
" 24	307	2 5 4	1 16 9
" 30	227	3 17 0	1 16 9

The Board of Agriculture had these weekly statements sent to them every few weeks. About the beginning of July I received notice from them to stop the experiment and sell off my birds as quickly as possible, as they were satisfied that it had proved itself to be a success. About three months later, *i.e.* about the end of September, when practically all my birds were sold off, I received further notice that my experiments were to be discontinued and the plant was to be broken up and distributed amongst the various Agricultural Educational centres.

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[1] About this date I received instructions from the Board of Agriculture to sell off my birds for killing purposes as quickly as possible.

[2] About this date I received further instructions that my experiments were to be discontinued and my plant was to be broken up and distributed among the various Agricultural Educational centres.

Egg Production

A few eggs were produced before November 6, 1914, and after September 24, 1915.

The carriage and commission on the above eggs came to

Carriage	£28	2	0
Commission . . .	29	7	0
	£57	9	0

Partial results of this experiment were published by the Board of Agriculture and Fisheries in their *Journal* for September 1916.

CHAPTER IV

Fatting

THE actual mechanical process of fattening chicken is not difficult to learn, and does not necessitate any great amount of skill or experience, but to pluck chicken at a commercial rate does. A man anxious to learn cramming, provided he has some one to show him, and plenty of lean birds to practise upon, could become fairly proficient within a month, but it would take him a very much longer time to become an expert judge as to when birds are exactly at their best to kill, and to become a proficient plucker.

To become a skilled and rapid plucker, that is to be able to compete with an experienced Sussex man, might easily necessitate a year's training. Untrained people's fingers and wrists are not strong enough, and it takes quite a long time with constant practice to develop and strengthen the muscles sufficiently. An unskilled man would possibly rough pluck from 2 to 3 birds per hour, and even at this rate they would not be very well done. Whereas a trained Sussex fatter can do 12 or more per hour.

To get the feathers out quickly and cleanly, that is without tearing the young and delicate skin, is an expert's job, and to watch the methodical way in which an expert plucker sets about his work would be quite a revelation to most people.

I have known men who stated that they could rough pluck as many as 30 birds per hour.

For a small-holder to start a fatting establishment without being (or having the services of) a trained plucker would be disastrous, as the cost of the plucking itself might be almost sufficient to absorb the greater portion of his profit.

In Sussex each killer, that is rough plucker, has usually two women to wait upon him, and as soon as the large feathers are taken out, the birds are handed over to the women to be stubbed, that is, to pick out the small immature feathers. These women are usually paid piece-work at the rate of ½d. per bird. The killer is also often paid piece-work at the rate of from ½d. to ¾d. per bird.

The fatting industry in Sussex is a highly organised one, and has become successful mainly by system and organisation.

The birds are fed at regular times, early in the morning and in the evening, leaving the middle of the day free for killing, plucking, and cleaning up. Possibly to feed three times per day might produce better and quicker results, but the fatters have discovered by experience that it pays them best to feed only at regular intervals, night and morning, leaving the middle of the day free for killing and plucking and preparing for market. They have also discovered by experience that it pays them to fatten their birds in the open, especially in the summer months, because although this may necessitate more food to produce a certain weight, yet by keeping them in the open they lessen the risk of disease. They have to collect their lean chickens from many sources, and at times bring them from Ireland and from many hundreds of miles away, and therefore it is impossible for them to always avoid receiving some diseased birds. If the birds collected from all sources were placed together in confined close quarters, disease might rapidly spread and the results be disastrous. Where the birds are only kept for a short period, as they are in Liverpool and other places, for partial fatting, this risk is not as great, and sheds are chiefly used.

Many fatters surround their open yards with hurdles so as to break the wind, and if they happen to have a barn, they may transfer their birds there to finish off. At Morden Hall we used a large barn. The birds experimented upon there were all reared by myself and in the pink of health, and therefore there was little or no risk of disease.

Fatters do not like visitors, and they do not care to take pupils. Fourteen years ago I was desirous of taking a course on a Sussex fatting establishment, and with this object went down there, and although I took with me excellent introductions from the principal salesmen in London, yet I could not induce any of them to accept me. I therefore hunted round and discovered a man who was a fatter on a large establishment, but who was fatting about one hundred birds in his back-yard on his own account in his spare time. I made arrangements with this man to take me on for a few weeks. He gave me a few birds to myself which I experimented upon, and by the end of my time I felt myself quite a proficient fatter, but I was not nearly quick enough as a plucker.

Large fatteners not only run their establishments on well-organised lines, but many of them also have worked up rounds for collecting their lean chickens from cottagers, farmers, and others. They send round their own carts on fixed days, calling on the cottagers, etc. The cottagers know exactly when to expect the carts and have their chickens ready. Some of the fatters have spent years in working up these rounds, and look upon them as their own property and part of their business. I have written the above in order to show that although fatting is undoubtedly a profitable business, yet it would not pay to start such a business in any locality. It is essential to be assured of a steady and constant supply of lean chickens at a reasonable price, and then to be a trained fatter and plucker.

I do not think in many cases it will pay a small-holder or ordinary farmer to fatten his own chickens, because I believe, if he has any spare time, he could place it to much better advantage by either rearing a larger number of chickens or doing more of his ordinary farm work.

COST OF A ONE-MAN PLANT, *i.e.* of a plant of sufficient size to absorb the whole of a man's time, and which will enable him to fatten 200 chickens per week.

Pre-War Prices

54 fatting coops at 6s. 6d.	£17	11	0
270 posts at ¾d.	0	16	10½
4 shaping presses at 6s.	1	4	0
1 cramming machine	3	10	0
2 tubs for food at 5s.	0	10	0
9 2-doz. peds at 3s. 3d.	1	9	3
1 wheelbarrow	1	5	0
1 stove for melting fat	0	10	6
Cleaning utensils, etc.	2	0	0
	£28	16	7½

Eight hundred chickens at an average price of 3s. each would cost a small-holder £120. The total capital required will therefore be £148.

The above represents the cost of a plant capable of turning out 200 birds per week. The usual method of fatting is to trough-feed for about 10 days, and then cram for about 10 days, which necessitates a four weeks' supply of birds, *i.e.* 800.

Fatting

If the birds are crammed in the manner in which we crammed them at Morden Hall during 1915, this will only require a three weeks' supply of birds, *i.e.* 600.

When the birds are not reared on the spot but are picked up haphazard, they will not be of the same quality as my birds were at Morden Hall in 1914 and 1915, and therefore it will almost certainly be necessary for the small-holder, in order to make first-rate birds of them, to keep them up for the usual time, that is for about three weeks.

All the fattened birds were sold through Mr. C. Brookes, 108 Central Meat Market, London.

FOODS USED DURING THE 1914 FATTING EXPERIMENTS AT MORDEN HALL

The meal consisted of ⅓ sharps and ⅔ ground oats. To this was added skimmed or separated milk, to which was added a proportion of water, about half and half, or in place of the natural milk condensed milk dissolved in warm water. About 1 quart of the above meal was used to from 2½ to 3 quarts of liquid, this forming a thick pasty mixture.

As skimmed milk was difficult to obtain at Morden Hall condensed milk was used during the greater part of the experiments. This was bought in cases holding 48 tins; each tin weighed about 13 ounces, and was dissolved as required in about 1 gallon of water.

In 1915 the birds were trough-fed on the above mixture for 2 days, and then crammed for about 10 days. Fat was added to the mixture after the third day at the rate of about ¼ ounce per head per day and gradually increased to ½ ounce, but many fatters use considerably more than this.

In 1914 the birds were kept up for about 21 days instead of for about 14 as in 1915. They were trough-fed for about 10 days and crammed for the remaining 10. On about the tenth day fat was added to their food at the rate of about ¼ ounce per head per day, gradually increasing to ½ ounce.

From the point of view of a producer, *i.e.* from the point of view of profit-producing, and not taking into consideration the fact which breed produces the finest birds when fatted, I believe the Buff Orpington is the best all-round bird. Sussex and Faverolle are also good. As a cross-breed, also from the point of view of profit-producing, I believe the Faverolle Orpington to be about the best.

[TABLE.

RESULTS OF 1914-1915 FATTING EXPERIMENTS AT MORDEN HALL

Year.	Number of Chickens put up.	Lean Chickens cost each when put up		The food eaten per Chicken cost	The total Cost of Fatted Chickens for Food and lean Birds was		The Chickens sold for after deducting Carriage and Commission		Leaving a Profit to the Small-holder per Bird of	Which would represent a Profit per Week to a Small-holder turning out 200 Birds per Week of			The average Weight of the lean Chickens when put up to fat was	The average Weight of the Chickens when fatted was	The increased Weight by fatting was per Bird
		s.	*d.*	*d.*	s.	*d.*	s.	*d.*	*d.*	£.	*s.*	*d.*	lbs.	lbs.	lbs.
1914	1079	3	1¾	7⅛	3	8⅞	4	5½	7¾	6	13	4[1]	4.05	5.28	1.23
1915	1178	3	3¼	7⅜	3	10⅝	4	9	10⅜	8	12	11[1]	3.76	4.70	0.94

[1] Out of this the small-holder would have to pay two women for stubbing 200 chickens at ½d. each = 8s. 4d.

Experiments at Morden Hall

The following articles on my small-holder fatting experiments appeared in the *Journal* of the Board of Agriculture and Fisheries of the following dates, copies of which giving full particulars can be had by application to the Secretary of the Board of Agriculture and Fisheries, 4 Whitehall Place, S.W., price 4d. each, post free.

	Capital.	Turnover.	Profit.
Date of Issue, April 1915			
Giving full particulars of my Fatting experiment (1079 birds) at Morden Hall in 1914. This represented 25 weeks' work, fatting 4 dozen birds per week, but a skilful fatter should be able to do at least four times as many per week. Morden Hall was too far from the station, the charge for transporting the birds from the farm to London working out at 3½d. per bird; it was, however, an excellent place so far as accommodation was concerned for making such an experiment .	£70	£262	£28
Date of Issue, Sept. 1916			
Giving full particulars of my fatting experiment (1178 birds) at Morden Hall in 1914. This represented 19 weeks' work, but a skilful fatter should be able to do at least 2½ times as many. The transport charge for this season was 2⅞d. per bird instead of 1d. as it should be . . .	£85	£304	£44

Fatting

The above profits represent the sum that would have been left to a small-holder after all running charges, such as rent, depreciation, etc., had been paid for, with the exception of his time and interest on his own capital. No retail trade was done, and the whole of the birds were sold wholesale.

CHAPTER V

Stock Birds

THE question of whether it is best for a person in Group 7 to keep or not to keep his own stock birds is not such an easy one to answer as one might think.

If he can buy suitable eggs locally from some one who makes a speciality of this branch of the industry and has the type of bird he requires, then I think he will be well advised not to bother about keeping his own, but to confine himself entirely to his rearing.

By not keeping stock birds on his place he minimises to a very great extent the risk of disease. His chickens will never have ticks and insect pests, and will therefore grow quicker and be more profitable. He will have much less worry, and therefore will be in a better frame of mind to give his full attention to the rearing, and will thus obtain more profitable and more uniform results from it.

In order to obtain an assured regular supply of 400 eggs per week from second or third season hens from December 1 to June, so that he will have none to buy from outside sources, might necessitate his keeping 300 hens.

After the middle of January these birds will lay a great many more eggs than he will require, and he will thus have to hunt round and find a market for them, probably ending by selling them for eating purposes at only a small margin of profit. His necessary working capital will be very much increased, and he will have to keep back each spring about 40 cockerels, and as he could not, during the months of December, January, and February, safely use the eggs from pullets for hatching purposes, this means that he would have either to retain 300 pullets each spring in order to take the place of the second season birds sold off after the breeding season, and thus necessitate the keeping throughout the whole year of quite a large egg-production plant, or to buy in 300 second season birds from outside sources each autumn and thus run the not inconsiderable risk of importing disease.

Taking all things into consideration I think he would be well advised not to keep his own stock birds, but to buy his eggs from reliable sources outside.

At Hounslow in 1912 I had to buy all my eggs, bringing them by rail from long distances. My egg charge there, per chicken sold, worked out at 4d. per head, whereas at Morden Hall in 1915, when I had my own stock birds, this charge came to 8d. per chicken sold. Of course this heavy charge was in a great measure due to the increased mortality there of the little chickens, which was in turn partly due to my having stock birds on the place, and thus increasing my labour and giving me more work than I could properly do.

In December and January one should not have more than 6 or 8 hens running with a cockerel. Taking it at 6 this represents, with 300 hens, 50 breeding-pens, which is a formidable undertaking.

I was very much against making the stock bird experiment at Morden Hall because I felt we were getting on to dangerous ground. I had tried it before when in Hampshire, and had come to the conclusion that, taking all things into consideration, it was wrong to combine the two branches.

The great thing is to find an easy and simple method of making money out of poultry, and then to keep strictly to this method.

Nearly everybody starting poultry starts with a few stock birds, and then hopes to build up a business by rearing their progeny. This is a very slow, tedious process; and in nearly every case they sooner or later get tired, get into difficulties, go wrong, and lose their money.

Instead of confining themselves to one clean-cut programme, they muddle up all the branches together, and one trouble leads to another, until they get into such difficulties that they feel they do not know where they are, lose their heads, and go under.

Stock Birds

If a person belonging to Group 7 came to me and said: " I want to keep a hundred stock birds, so that I may produce at least a portion of my eggs. Will you kindly advise me how best to set about it ? "

I should say to him: "About October advertise in the poultry papers for second season hens. The best breeds for you to ask for will be Buff Orpingtons; or if you wish to make a speciality of eggs, White Wyandottes and Rhode Islands. If you offer 4s. each you will probably get as many offered you as you require. You should deposit the money with the editor of a poultry paper, and have the birds sent on approval, first making the vendor guarantee that they are all in perfect health. You will then have to purchase one cockerel to every six to eight hens. You will not buy really good early hatched cockerels much under 7s. 6d. each. In fact it will scarcely pay any one to breed them to sell at this price, because such birds ought to have been hatched in February, and by June, had the producer known how to market them for eating purposes to the best advantage, they would have brought him then from 4s. to 5s. each.

" In order to obtain the most fertile eggs with the strongest germs, the best plan of managing them will be to put them into small colony houses out on the open fields, in lots of from 6 to 8 birds to a house. As probably, however, you will not have sufficient land to do this, you might instead house them in night arks or large ordinary houses in lots of 20 with 3 cockerels. But if still not sufficient land for this, then you might have a large house situated near your dwelling-house to hold the whole 100 birds, putting all the cockerels with them and giving them a free range. If, however, for some reason you cannot do this, then you must put them into pens. One of the great difficulties about breeding-pens is, that unless these are boarded up so that the cockerels in the adjoining runs cannot get at one another, they will be constantly fighting. At Morden Hall, we put 1-inch-mesh string-netting 2 feet high against the wire-netting, which kept them apart fairly well.

"If you decide to pen them, perhaps your best method will be to sandwich the breeding-pens between the chicken-pens, that is, keep the first pen for chickens, the second for stock birds, the third for chickens, and so on.

"This will be your cheapest plan both from the point of view of plant and labour."

My chicken-pens at Morden Hall were 30 yards by 10 yards, and this size does quite well for 20 hens and 2 or 3 cockerels. One hundred stock birds by this method would thus necessitate five runs and five houses, costing in normal times about £3 per run (houses and all feeding utensils included), that is £15 in all. This is the cheapest and most satisfactory plan I can recommend, and although it might not be quite the best from the point of view of obtaining the most fertile eggs, yet it will certainly be best from that of saving of labour and expense.

At Morden Hall we tried in competition ten different types of houses in order to ascertain whether any of them showed any decided advantage over the night ark system, and in these houses we placed a number of different breeds and cross-breeds in order to watch the results of the different birds when they had been fattened.

The houses were the most expensive, and were believed to be the best that could be obtained in England, but the night arks proved to be much the most satisfactory and best in every respect.

Of the breeds and cross-breeds we tried, the Cou Cou de Maline crossed with the Speckled Sussex made the best bird for fatting purposes.

I have now had four seasons' experience fatting chickens, and for all-round merit, from a commercial point of view, have come to the conclusion that the Buff Orpington is the best to use. It may not give quite as fine flesh or be of quite as good a shape as the Sussex or Jubilee Orpington, or as an Indian Game crossed with a Dorking; but from a profit-and-loss point of view, that is, from the point of view of the person attempting to rear table chicken, to be sold as early and as late in the season as possible, on the wholesale meat markets, I believe the Buff Orpington to be the best.

Probably at shows of table chickens the pure Buff Orpington would not win the prize, but this does not matter; what does matter is what will pay a producer best to produce when he has to sell his produce solely for commercial purposes on the wholesale meat markets.

At Morden Hall we had 130 stock birds (hens) which produced 8974 eggs in the season, that is, 748 dozen, at a cost of £61 : 6 : 3 for food and all charges, including the cost of the cockerels' keep. Each hen therefore produced during the breeding season 69 eggs, at a cost of 1s. 7¾d. per dozen. Had these eggs been sold at 2s. 6d. per dozen there would have been a profit of 4s. 3d. per bird.

The following facts are interesting.

Each hen produced roughly 70 eggs. If they had all been set and properly incubated and the chickens carefully reared, 2 eggs should have been sufficient to produce a chicken, and therefore each hen would have produced 35; taking half of these as pullets this represents an output of 17 pullets per hen per season.

One cannot reckon on less than 4 eggs to produce a pullet. I have seen it stated that in America the large establishments allow 8 eggs per pullet. But I should say that, were eggs carefully incubated and the chickens reared under close personal attention, 4 to 5 eggs to a pullet would be a very fair estimate of the number required. Therefore, any one wishing to produce 1000 pullets per year should put down a plant capable of incubating 4000 to 5000 eggs per season, which would require the output of 70 hens. One hundred and forty hens should produce sufficient eggs for an output of 2000 pullets per season, provided the whole of their eggs were carefully incubated, and their chickens carefully reared from December 1 to June.

If a small-holder intends to go in for egg-production alone, and can obtain an assured market for hatching eggs at a fair price, say 2s. 6d. per dozen throughout the season, then the retention of pullets over their second season would be quite a wise procedure, as they would pay him as well as if not better than keeping pullets in their first season for commercial egg production.

I should say that the best breeds for any one to take up who was thinking of starting a farm to supply eggs for hatching purposes would be Buff Orpingtons, White Wyandottes, Rhode Islands, Faverolles, and Leghorns. These are the best breeds for general all-round purposes, with the exception of Leghorns, which is essentially an egg-producing breed.

The foods used and the general management of the stock birds at Morden Hall were exactly on the same lines as those of the 1000 laying pullets.

Weekly Egg Record

A Weekly Record of the Eggs produced at Morden Hall by the 130 second season Hens in 1915

Date.	Number of Eggs produced during the Week.	Date.	Number of Eggs produced during the Week.
Dec. 4	4	Apr. 9	491
,, 11	13	,, 16	499
,, 18	43	,, 23	495
,, 25	94	,, 30	458
Jan. 1	136	May 7	456
,, 8	169	,, 14	400
,, 15	234	,, 21	412
,, 22	287	,, 28	409
,, 29	322	June 4	340
Feb. 5	310	,, 11	266
,, 12	356	,, 18	288
,, 19	374	,, 25	245
,, 26	422	July 2	235
Mar. 5	442	,, 9	285
,, 12	486	,, 16	226
,, 19	470	,, 24	195
,, 26	469	,, 30	111
Apr. 2	519		

CHAPTER VI

Chicken-Rearing

A DESCRIPTION of the object of the demonstrations made by me for the Board of Agriculture and Fisheries at Morden Hall near Cambridge, and Haslington Hall near Crewe, and of the methods adopted, is given below, together with some hints for the guidance of persons wishing to follow my method.

The object of the demonstration was to give a practical illustration of the methods by which a regular supply of table chickens can be produced on a small-holding, during those months of the year in which the conditions are favourable to both rearing and marketing. The raising of chickens by this method should occupy only a portion of the small-holder's time, while the area of land devoted to the chickens would form only a portion of the total area of the holding. The demand for table poultry is constant, and at certain seasons of the year the supply of birds of suitable quality is meagre, so that there is little difficulty in securing satisfactory markets for a steady supply of uniform quality.

My aim was to raise during the season from 3000 to 4000 chickens, weighing from 3½ lbs. to 4 lbs., and, in order to accomplish this, incubation commenced at the beginning of December and continued until the early part of June. The birds reach marketable size in from 12 to 16 weeks, and thus the last batch of chickens was ready for sale about the middle of October.

AREA OF LAND REQUIRED FOR CHICKEN-REARING

In order to raise 3000 to 4000 chickens during the period indicated it has been found necessary to utilise about 3 to 4 acres of land per year. The land selected should be fairly light, and it should not have been occupied by poultry for some considerable time previous to its use as a rearing-ground. The chickens should not be raised year after year on the same ground, but arrangements should be made to change the site every year so that each plot of 3 to 4 acres carries poultry once in three or four years. The land occupied by the birds will receive a considerable amount of manure during the season, which will greatly increase the following year's hay crop.

CAPITAL REQUIRED

The initial capital required in normal times for raising chickens on the scale undertaken by me is from £250 to £300, and a considerable portion of this amount is devoted to the purchase of the necessary appliances. The minimum equipment required for an output of 3000 chickens per season is given below:

Pre-War Prices

	£	s.	d.
4 incubators at £6 : 5s.	25	0	0
14 brooders at £3 : 10s.	49	0	0
24 houses at £1 : 10s.	36	0	0
31 rolls 4-foot netting at 9s. 6d.	14	14	6
12 rolls 2-foot netting at 9s. 6d.	5	14	0
500 stakes at ½d.	1	0	10
Bamboo	1	0	0
Pegs	1	0	0
24 water-pans at 7d.	0	14	0
24 grit-pans at 7d.	0	14	0
24 feeding-tins at 4d.	0	8	0
14 grit-tins for brooders at 1s.	0	14	0
48 food-tins at 2d.	0	8	0
12 food-boxes at 1s.	0	12	0
2 barrows at 16s.	1	12	0
1 water barrow	1	10	0
6 tins for mixing food at 3s. 3d.	0	19	6
2 corn-bins at 7s. 6d.	0	15	0
4 corn-bins at 4s.	0	16	0
6 market-baskets at 8s. 6d.	2	11	0
3 food-baskets at 1s. 6d.	0	4	6
60 food-tins at 4½d.	1	2	6
1 weighing machine	1	10	0
1 weighing machine	1	0	0
Buckets, etc.	1	0	0
Kettles and sundries	0	6	0
	£150	5	10

LAYING OUT THE GROUND

The method of laying out the ground and of utilising the appliances was readily appreciated by those who visited my demonstrations. A small portion of ground near the dwelling-house was set aside for the reception of two or three brooders, into which the chickens were placed when they first left the incubators, and in which they remained for two weeks in order that they might be under constant observation, and be trained to run up to the hover of the brooder when they felt cold, and so avoid the risk of " packing " or crowding.

The remainder of the ground was laid out for the reception of the brooders and Sussex Arks into which these chickens were gradually drafted. Each brooder was placed in a run enclosed by wire-netting 2 feet high, supported by light stakes placed at intervals. These runs may conveniently measure 6 yards by 20 yards, and were used for the chickens up to the age of seven weeks.

Each Sussex Ark was placed in a run measuring 30 yards by 10 yards, enclosed by wire-netting 4 feet high supported by stakes. Access was gained to the larger runs by an arrangement which permitted of a short length of the wire-netting between two posts being swung aside. When seven weeks old the chickens were transferred to these arks in lots of 60. The plan followed at Morden Hall was to lay out the runs for the younger chickens near the centre of the ground, while those of the older chickens were placed outside and extended to the limits of the area. This was designed in order to prevent the depredations of stoats, etc. During 1915 I had not sufficient land for this purpose, and in consequence lost a large number of little chickens from this cause. Paths were provided which gave access to the pens, and permitted the food being conveyed to the birds with the least expenditure of labour; galvanised iron food-bins containing grain and grit were placed in convenient positions near the runs. The object in selecting and arranging the appliances and in planning the runs was to secure efficiency and economy, and prevent loss from vermin, and to facilitate the adoption of a standardised method of management which was calculated to produce uniform results.

Supply of Eggs for Hatching

The eggs bought for hatching were selected from breeds which are suitable for table purposes, and eggs of pure Sussex, pure Faverolles, and first crosses of these breeds may be recommended. The eggs should be the produce of hens in their second year, and the pens from which the eggs are obtained should be judiciously mated. It is of the utmost importance that the breeding stock should be vigorous and healthy. The eggs used for artificial incubation should be as fresh as possible, and should preferably be not more than a week old when placed in the incubator. There are great advantages in securing a local supply of eggs, and there is likely to be a definite gain in the percentage of chickens hatched when the eggs are procured locally as compared with eggs obtained from a distance. In this connection attention may be directed to the possibility of co-operation among several poultry-keepers, some of whom might devote their attention to producing the eggs and others to rearing the chickens, as described in Chapter I.

In the case of the Morden Hall demonstration, during the first season from 300 to 400 eggs for hatching were bought each week from December 1 to June 7; and the approximate prices paid per dozen by me were as follows: December, 3s.; January, 2s. 6d.; February, 2s. 3d.; March, 2s.; April and May, 1s. 6d. During the second season the bulk of the eggs were produced on the place.

INCUBATORS

The eggs were hatched in incubators of the hot-air type, which varied in capacity from 150 to 390 eggs; at least one incubator was started each week during the hatching period. I kept three or four incubators constantly at work, and held additional machines in reserve in case of need or accident, and to allow for the necessary cleaning and overhauling of the machines after each hatching period.

The weekly supply of eggs was received on Saturday, and the eggs were prepared for placing in the incubator next day. This is found to be a convenient arrangement, as the chickens are then taken out of the machine on a Monday morning.

The eggs were turned twice daily until the eighteenth day; on the seventh day they were tested and the infertiles set aside for feeding the chickens in the second week.

There are several reliable makes of both hot-water and hot-air incubators on the market, and the operator is advised to follow carefully the instructions provided by the maker for working the particular machine selected.

The room in which the incubators are placed should be one in which a fairly equable temperature (if possible facing north) can be maintained, it should be free from vibration, and, while adequately ventilated, it should be free from draughts.

REARING (TOTAL PERIOD, 12–16 WEEKS)

The chickens were left in the incubator until the twenty-second day, when they were transferred to the brooders. For the first two weeks, as has already been pointed out, they remained in a portion of the rearing-ground where they were kept under constant observation. The brooders selected for use were of the hot-air type. Those used for raising chickens on the scale undertaken by me must be capable of giving satisfactory results when worked in the open under the severe conditions of mid-winter, and also under the very different conditions which prevail in the late spring. They must be simple in construction and should not demand incessant attention. The brooders used at Morden Hall were capable of accommodating 60 chickens up to the age of from 5 to 7 weeks, and hence a hatch of 120 chickens required the use of two brooders. Two lamps were provided for each machine in order that one might be cleaned and filled whilst the other was in use. The brooders were cleaned out regularly once a week until the chicks were four weeks old, and twice a week afterwards. Peat moss was used for covering the floors of the brooders.

If the small-holder has the necessary accommodation it is best, though not essential, to keep the little chickens indoors in indoor brooders during the first week or 10 days of their lives.

FEEDING AND MANAGEMENT

First week.—During the first week the little birds were provided at frequent intervals with just as much of the following dry chick mixture as they would clear up, or when I had not time to make it up, I bought instead Armitage's best dry chick feed:

DRY CHICK FEED MIXTURE

Wheat (cracked)	50 per cent
Millet	10 ,,
Canary seed	20 ,,
Best meat	10 ,,
Maize (cracked)	5 ,,
Rice	5 ,,

An unlimited supply of pure water was always provided, and grit was scattered on the floor of the brooder, and was constantly available throughout the whole process of rearing.

On the third day they were allowed down into the cold department of their brooders, and outside into small wired runs attached to the end of the brooders when one week old.

Second week.—During the second week the birds were fed in the following way, their grass runs being made gradually larger and larger by shifting the sticks supporting the 2-foot wire netting:

At daybreak	Chick feed
At 9 A.M.	Hard-boiled egg
At 12 noon	Chick feed
At 2.30 P.M.	Chick feed
At 6 P.M. (or half-an-hour before sunset, according to the season)	Chick feed

Bread and milk or rice pudding makes an excellent substitute for their grain feed at 12 noon.

When the chickens were two weeks old they were moved to a brooder in the centre of the rearing field, and were confined for one day in a small wire run attached to the end of the machine. This small run was then removed, and the chickens had access to the larger run, 20 yards × 6 yards, in which the brooder was placed.

Third and fourth weeks.—Two tins, one containing groats and one preserved meat, and fitted with wire guards to prevent the birds scratching out the food, were placed overnight in the brooder so that the first feed might be obtained at daybreak. These tins were removed at 7 A.M. when the birds were let out of the brooder. At 9 A.M. soft food was given, consisting of biscuit meal and 10 per cent of meat. The biscuit meal and meat meal were mixed with boiling water and dried off with equal parts of sifted barley-meal and sharps. The mixture when prepared should be crumbly, the utmost care being taken to mix the ingredients thoroughly and avoid the use of "sloppy" food, which is a frequent cause of trouble. At 11 A.M. I went round with four pails, one of chick feed, one of meat, one of groats, and one of corn for chickens over 4 weeks. I first placed in the groat tin what I judged would be sufficient for the morning feed, then if wanted a handful of meat in the meat tin, then I scattered on the ground any dust or any surplus grain left over in the grain tins, and filled up with chick feed or wheat and maize ready for the evening feed. At 1 P.M. soft food prepared as described above was again given to the chickens. About 6 P.M., or earlier according to the season, the birds receive as much dry chick feed as they will eat, also in wired tins from which the grain cannot be scratched out.

When 4 weeks old the chickens were divided into lots of 40, and each lot provided with a separate brooder and an enclosed wire run as before.

Fifth, sixth, and seventh weeks.—At the beginning of the fifth week after hatching, and until they were seven weeks old, the chickens are fed as in the fourth week, but instead of the chick feed they receive a mixture consisting of 85 per cent whole wheat and 15 per cent cracked maize.

When the chicks were seven weeks old they were moved to the larger runs and housed in Sussex Arks. The Sussex Arks are provided with slatted floors through which the manure falls. Wooden floors are placed on the ground below the arks in order that the manure may be collected and utilised. Sacks should be placed over the slats for the first two weeks.

Eighth to sixteenth week.—At 7 A.M. the birds received a mixture composed of:

Meat meal	1 lb.	= 4½ lbs.
Biscuit meal	2 ,,	
Bran	1½ ,,	

This amount is soaked in 1½ gallons of boiling water and dried off with:

Barley meal	2 lbs.	Fine sharps	9 lbs.

This ration was given to the birds again at 1 P.M. The evening feed consists of 90 per cent of whole wheat and 10 per cent of cracked maize.

An alternative system of feeding which has proved advantageous is as follows:

7 A.M. Soft food (as described above).
10.30 A.M. A half feed of mixed grain.
1.30 P.M. A half feed of the soft food.
6 P.M. As much mixed grain as the birds will eat.

THE QUALITY OF FOODS USED

The quality of the meals and grain used for feeding is a matter of considerable importance. All the feeding-stuffs should be sweet, and freshly milled meals should be used when possible. If the feeding-stuffs are bought in quantity they should be stored in suitable bins so that they may not deteriorate. The ingredients used by me are such as can be obtained everywhere, but care should be taken in selecting them, as experience has proved that the health, and consequently the rapid growth and development of the birds, is largely dependent on the care exercised in this matter, *i.e.* in the foods being absolutely fresh.

MARKETING

When the birds are between 12 and 16 weeks old they should weigh from 3½ lbs. to 4 lbs., and were sold during 1912, 1913, and 1914 by contract at prices varying from 3s. 9d. each in April to 2s. 6d. each in September. They were sent away alive in crates containing 12 to 20 birds, the purchaser paying carriage. This method has advantages in that it saves the rearer a considerable amount of trouble and removes anxiety regarding market fluctuations, for the season's output is sold beforehand at fixed rates for the different months, but the price should not drop for first-class birds below 2s. 9d., and then only during September and October.

On the other hand, "finished" birds, while their preparation involves additional expense in food and skilled labour, command a better market and would possibly yield a higher return. In 1915 all the birds, both fatted and unfatted, were sold by Mr. C. Brookes, 208 Central Market, at the ruling wholesale market prices.

It must be remembered that artificial rearing necessitates constant personal attention, care, and sympathy. The operator takes the place of the mother-hen, consequently if his mind is too much occupied with other things the little chickens suffer. There are good hens from the point of view of mothers and bad hens, and in much the same way there are good rearers and bad rearers. If a hen neglects her chickens during the first few weeks of their lives they will die, and in much the same way if a rearer neglects the little chickens under his care they may die.

“Too Many Cooks”

In artificial incubating and rearing too many cooks spoil the broth. During my last season at Morden Hall three people had a hand in the rearing. One person working an incubator, and having full and complete control without any break throughout the whole hatch, will get much better results than when two or three people have a hand in it. This also applies to the rearing. There is a sympathy between the operator and the incubator and the operator and the brooders which seems to be lost as soon as the control is divided.

With a properly arranged cottage and land, and being left quietly alone to devote the whole of his time and attention to his work, a small-holder or other person can undoubtedly make a first-rate living out of chicken-rearing for table purposes alone.

As an indication of the unsuitability of Morden Hall for the purpose of producing a successful table chicken rearing experiment from the point of view of profit and loss, the cost of transport per bird from the farm to London (where they were sold) worked out at slightly over 4¾d. per head, which is about 3¾d. per head in excess of what it ought to be. The above unnecessary, excessive charge was in itself sufficient to mar if not to ruin the balance sheet of a commercial test experiment, as such an unnecessary charge would in itself have represented a reduction of the small-holder’s income, on an output of 4000 chickens, of over £50 per year.

I give below a table showing what the birds cost during the four seasons 1912–1915, when my work was under the observation of the Board of Agriculture, for raw material, that is, for food, eggs, and oil.

In 1912 I was working under good conditions, and after paying for the raw material, that is, food, eggs, and oil, there was a profit balance on the cost of the raw material over the selling price of 1s. 0¾d. per bird; in 1913 there was 9⅛d.; in 1914, 10¼d.; and in 1915, 10½d.

Had the egg charge in 1915 not been greater than in 1912, as there was no reason why it should have been as all the eggs were purchased during 1912, whereas most of them were produced on the spot in 1915, then the profit per bird would have been 1s. 2½d. per head. Had it been the same in 1914 there would have been a profit of 1s. 1¼d. per bird, and in 1913, 10⅝d.

The increased egg charge which marred the financial results of my chicken-rearing experiments during 1913 and 1914 was mainly due to the increased rate of mortality brought about owing to the work being used for demonstrational purposes, having to continually attend to visitors, and to losses from hawks, crows, stoats, owls, etc., due to my not having time to properly look after them, also owing to the control of the rearing being divided, and the rearing field being much too far from the dwelling-house and not under observation from it.

Commercial success in table chicken rearing depends, firstly, on the situation and suitability of the holding, and secondly, on what one might term having proper knowledge, that is, by having the necessary experience and knowledge oneself, or being guided by some one who has, to be able to select a chain of well-tried methods, appliances, foods, and marketing procedure. The personal effort alone, no matter how persevering and attentive, will not avail unless it is supplemented by such knowledge.

To produce the best commercial results a properly designed dry small-holding in a proper situation for such a purpose should be used. Proper eggs, in regard to freshness, etc., must be obtainable at reasonable prices, produced by a proper age of hen mated to cockerels hatched at the proper time of the year. The eggs must be incubated in incubators properly selected for the purpose in view, and the chickens must be reared in properly selected foster-mothers, and then transported to a proper type of commercial house in a properly designed system of runs. The birds must be properly fed in a proper manner on foods bought at commercial prices, and be of a proper breed. The holding should be properly situated near a railway station within one mile or so, and the birds properly and regularly marketed in a proper condition immediately they have arrived at their most profitable stage.

Chicken-Rearing

The necessity of having such a chain of proper conditions can only be appreciated by some one who has had many years of practical experience as a table chicken rearer.

I think that a fair estimate of the total cost of a plant to produce a table chicken is 1s., *i.e.* for incubators, foster-mothers, houses, feeding utensils, and everything; and the profit as a reward for a small-holder's labour should be about 1s. per bird.

Approximate estimates of capital required and financial results which may be expected from the individualistic effort when applied to table bird production under practical working conditions:

Pre-War Conditions

Total Number of Chickens to be produced per Year.	Plant will cost approx.	Live Stock will cost approx.	Total cost approx.	Profit to Small-holder per Year approx.	Land necessary per Year. Acres.
1000	£50	£25	£75	£50	¾
2000	100	50	150	100	1½
3000	150	75	225	150	2¼
4000	200	100	300	200	3

An output of 4000 table chickens per season would just about keep a boy and man fully employed for six months. During the other six months they could put their time to other things and thus considerably increase their income.

RESULTS OBTAINED FROM MY CHICKEN REARING DEMONSTRATIONS WHEN UNDER THE OBSERVATION OF THE BOARD OF AGRICULTURE AND FISHERIES

Date.	Number of Birds reared.	Cost of the Food per Bird.	Cost of Eggs per Bird.	Cost of Oil per Bird.	Total Cost of Raw Material.	Birds realised, gross.	Profit per Bird over the Cost of Raw Material, that is food, eggs, and oil.
		d.	*d.*	*d.*	*d.*	*d.*	*d.*
1912	2192	15.57	4.00	0.50	20.07	33.00	12.93 [1]
1913	3471	19.04	5.53	0.79	25.36	34.49	9.13 [1]
1914	3549	16.81	7.03	1.02	24.86	35.17	10.29 [1]
1915	2759	22.71	8.00	0.96	31.67	42.23	10.56 [1]

The above birds when sold weighed between 3½ lb. and 4 lb.

[1] From this must be deducted railway charges, rent, depreciation, etc., which under normal conditions should represent 3⅝d. per bird. If the birds are sold through a salesman and not through a shop, there will also be the salesman's commission to deduct of about 2d. The birds during 1912 and 1913 and 1914 were sold direct to shops, and those in 1915 through a salesman.

CHAPTER VII

Diseases, Medicine, and General Information

The following are the only medicines I use and find necessary

THE only medicines used by me during my experiments were the following, a supply of which was always kept on hand.

Epsom Salts.—Once every week I gave the birds Epsom salts in their soft food, their food was mixed up in large galvanised baths, each bath of food requiring one and a half gallons of boiling water, in each 1½-gallon kettle was dissolved a good handful of Epsom salts.

Castor Oil.—If any of the birds were at any time noticed to be off their feed and looking seedy, they were at once caught and each given a teaspoonful of castor oil.

Cod Liver Oil.—If any of the birds were noticed to be suffering from bronchitis or colds they were given a small teaspoonful of cod liver oil. Cod liver oil was also found to be an excellent thing for mixing in with the small chickens' food.

Olive Oil.—If any of the very young chickens were noticed to be not looking well, they were at once given a small quantity of olive oil.

Permanganate of Potash.—Before the water-cart was taken out to the runs a small quantity of permanganate of potash was placed in the water, just sufficient to give it a light claret colour. A bottle containing permanganate of potash in solution was always kept at hand for this purpose.

Izal.—One teaspoonful was put into the 1½-gallon kettles of boiling water used for mixing each bath of soft food, this was sometimes kept up for several weeks.

Conkey's Roup Cure.—When there were any signs of roupy colds the birds were at once isolated, a small portion of the powder placed on their tongue, and for several days they would have a small quantity of this roup powder placed in their drinking water.

In cases of crop binds I give the birds two teaspoonfuls of olive oil with a little warm water, and gently work the crops with my hand until it becomes soft. This is repeated every two or three hours until the bird is well.

Red Mite.—There is no real lasting cure except creosote all houses, and foster-mothers should be creosoted inside and out yearly. I prefer creosote to paint because of red mite. It is best to creosote all woodwork about July or August as, if one waits longer, the wood gets too wet and soddened and therefore will not absorb it. When all woodwork is creosoted yearly limewash is unnecessary.

Grey Ticks.—If the little chickens look at any time unwell without any apparent cause their heads and necks should be examined, and if any grey ticks are found their heads and necks should be well rubbed with lard to which may be added a little flower of sulphur. Ticks and red mites unless kept under are about the worst curses to table-chicken rearing. They retard their growth and therefore the chickens' flesh costs more to produce.

Hints on choosing an Incubator.—For people in Groups 2, 3, 4, and 6, who wish to start hatching operations early in the season, and to have one or two incubators, I recommend the hot-water type of 60- or 100-egg size. Such incubators can be worked in a passage, or empty room, and no matter what the outside temperature may be they can always be relied upon to keep their heat. At times, during the winter months when I have had only one large hot-air incubator working by itself, I have found a difficulty in keeping up the heat, but when two or three are working together in one room then there is no difficulty on this score, as they help each other in maintaining their heat.

For people in Groups 5 or 7 probably the 400-egg size hot-air incubator will prove the best, but when the trays are full of eggs they are rather too heavy for a woman to lift; and therefore instead of a 400-egg size two 150-egg machines, with a spare machine, so that when the eggs are tested out on the seventh day the two 150 machines may be filled up with the fertile eggs from the other. This arrangement seems to work with some people better than having a 400-egg machine; as for some reason the 150-egg size (hot air) appears to give better hatching results than the 400 (hot air). Of course such an arrangement entails a larger expenditure of capital, more room is required, and there are three lamps to attend to instead of one.

For people in Group 8, and in some cases for those in Group 7, a mammoth incubator may be the best. These people, unlike those in No. 7 (who wish to start operations in December and go on until June), wish to hatch out the greater proportion of their birds in as short a space of time as possible in the middle of the spring, that is, about March and April. This being of special importance to people who are going in for Leghorns for intensive and semi-intensive winter egg production.

It is better for people in Groups 1 and 2 to use broody hens rather than incubators.

Hints on choosing a Foster-mother.—I most certainly recommend individual brooders for people in Groups 3, 4, 6, and 7; for people in Groups 5 and

8 a larger brooder house may be best. Brooder houses are excellent things from the middle of February to the middle of April, but I do not care for them in December, January, May, and June. For people who are going in for a short hatching season, that is, who wish to hatch out a large number of birds in a short space of time, brooder houses are perhaps necessary; but for such people as small-holders in Group 7, who lay themselves out for a long rearing season, with comparatively few stock birds, the individual brooder is decidedly the best. They are perhaps a little more trouble, but the little extra attention they require is rather an advantage than otherwise, because it means that the attendant has to be more out and about amongst the little chickens.

For people in Groups 3, 4, and 6 who intend to have only one or two brooders, and then to keep them close at home, in a more or less sheltered position, hot-water brooders of the type made by Spratts, Tamlin, etc., are perhaps the best. For other people working on a larger scale who also have sheltered positions brooders with stable lamps do excellently, but for people in Group 7, who have to work in exposed windy spots, and wish to have, say 30 at work, then foster-mothers such as I use I believe to be the best.

I have tried every kind and system of brooders, and this brooder question is the most difficult of all the poultry questions, and if people are not properly advised on this point according to their groups, then no matter if all their other factors are right they will fail.

For theoretical people, that is, people without sufficient practical experience, say, of less than six years of chicken-rearing on a large commercial scale for market purposes, *i.e.* for table birds, to recommend large brooder houses and mammoth incubators to small-holders and people in the wrong group is a very wrong procedure, as in my opinion they are sending such people to certain ruin.

Seven years ago I made a large number of experiments, covering several months, with stoves burning anthracite or coke for chicken-rearing, the idea of which was to place from 600 to 1000 little chickens in one large room with a specially designed stove in the centre, round which the chickens gathered and took up their position according to the heat they required. After many months' work I managed to get it to work satisfactorily, but gave up the idea because I found that to use such a machine would necessitate my rearranging the whole of my plans; and if I continued developing it I would have had to give up the individualistic effort, that is the small-holder effort, for that of the capitalist.

For people in Groups 8 and 9 these brooders may work in well, but they are not, in my opinion, suitable for people in the other groups, as such machines cannot be worked economically with a few chickens in them, and to hatch out 1000 chickens per week necessitates a large plant and would be far beyond an ordinary small-holder's means. Two thousand hatchable eggs would be required at one time, and if hatching weekly was followed, which, owing to the difficulty of obtaining a reliable and constant supply of fertile eggs, is the correct thing to do, 16,000 growing chickens would be on the place at one time, which would require several hands, and such an undertaking would be only suitable for capitalists, that is to people in Group No. 8, or day-old chick men No. 9.

I understand that in America during the last year or two this type of brooder has been greatly improved, and can now be used economically for broods as small as 250, in which case they may be useful to small-holders.

I have spent ten years in investigating this brooder question, under all kinds of conditions, from the point of view of people in Group 7.

Buying Day-old Chickens.—If one can buy day-old chickens from December to June as reliable as one can hatch them oneself, then I say by all means do so, and do not bother about hatching your own; but unfortunately in my experience one cannot do this, and therefore it is best to have one's own incubators, and hatch out one's own chickens and thus have a certain amount of control over their quality.

When one has one's own incubators and hatches out one's own chickens one knows something about their origin, and if it be found that the chickens are turning out weakly, then it is possible to trace the reason. Sometimes I have bought day-old chickens and they have been most satisfactory, but on the other hand I have bought them and they have turned out anything but satisfactory. I strongly recommend small-holders, cottagers, etc., not to buy day-old chickens but to hatch their own. My remarks about buying eggs for hatching also applies to day-old chickens. For those people who wish to rear up to 1000 chickens yearly, for egg production, and these mostly during February, March, and April, it is undoubtedly their best plan to keep their own stock birds, and thus have full control over the quality of the eggs they set; and in order to introduce fresh blood, *i.e.* cockerels, such people might buy two or three settings of eggs early in the season, or a few early hatched cockerels during June or July.

Sale of Poultry Manure.—It is best to advertise in one's local paper. The price, provided it is absolutely pure and kept under cover, should range from £1 to £5 per ton.

Selling Eggs and Poultry.—I sold practically the whole of my produce during 1915 through Mr. Charles Brookes, 208 Central Meat Market, London, at very satisfactory prices. It is best either to deal with a large salesman on the wholesale market or direct with a large shop, but in the long run I think producers will find it will pay them best to be their own forwarding agents and stick to the salesman in the large centres, such as London, Manchester, Nottingham, Leeds, Sheffield, etc.

Sale of Feathers.—I sold all my feathers through Mr. C. Brookes during both years 1914 and 1915.

Buying Eggs for Hatching Purposes.—I prefer to buy my eggs from ordinary farmers' wives and daughters, who take an interest in their poultry, and give them free range.

I seldom get good results, *i.e.* strong, robust chickens, from eggs produced by specialist poultry farmers, who keep their birds in runs, and make a speciality of eggs for hatching purposes, and this is particularly noticeable towards the end of the breeding season. The more natural the conditions under which stock birds are kept, such as ordinary farmyard conditions, the better quality their eggs will be for hatching purposes, and the stronger the chickens when hatched. Hens which are kept in runs, with the sole object of producing as many eggs as possible, in as short a time as possible, to be sold for hatching purposes are, immediately they have produced their batch, transferred to a broody coop, knocked off their broodiness as quickly as possible, and put back into the breeding-pens. The germs in these eggs will naturally under this forcing process not be nearly as strong as in the case of the farmyard hen, which usually, immediately she comes broody (in the spring) is allowed to sit, bring up her brood, and then lay another batch.

Contrary to general belief I find that the birds which are fittest to produce the strongest and most satisfactory stock are in the hands of the ordinary farmer, cottager, or small-holder, who keep their birds under farmyard conditions, and not in the condition of that of the specialist poultry farmer.

Books.—I strongly recommend anybody thinking of going in for fatting to buy the two following books on this subject. *Fattening Fowls,* by E. Cobbs (1s. 1d.), *The Feathered World,* 9 Arundel Street, Strand, W.C.; and *How to Fatten Fowls* (1s. 1d.), by J. W. Hurst, The Poultry Press, Ltd., 154 Fleet Street, London, E.C.

In Case of Disease.—In my early days I used to apply to Mr. W. Hooley, Poultry Expert to *The Poultry World,* 154 Fleet Street, E.C., who gave me excellent advice.

Advertising for Eggs for Incubators, etc.—I usually use the columns of *The Poultry World,* 154 Fleet Street, E.C., but all the poultry papers, such as *Feathered World, Poultry,* etc., are good; and any beginner cannot do better than subscribe to one of these papers. If at any time he is in trouble he should at once write to the editor for advice.

My opinions do not in all things coincide with theirs, but they have to cater for all groups of poultry keepers, whereas I specialise and have concentrated my attention for many years entirely on the one.

All poultry keepers should apply to The Board of Agriculture and Fisheries for copies of their pamphlets on Poultry, which are supplied free. Letters to them for this purpose need not be stamped.

For the guidance of people taking up poultry I give below a list of firms from whom I obtain my appliances and foods.

I have never accepted a commission in my life, and have no intention of doing so, therefore in recommending any particular food, appliance, book, paper, etc., I have no axe of my own to grind. My object is merely to give helpful information, and my opinions are quite unbiassed.

The following are not advertisements, and I am not receiving any payment for any advertisement in this book, the names are merely given as a help and guidance to the reader.

Night Arks.—These are made for me by Horace Stephens, Incubator Manufacturer, Tuffley, Gloucester. He has also made many of my foster-mothers, and I have always found his workmanship excellent.

Incubators.—I principally use Cypher incubators, sold by the Cypher Incubator Company, 115 Finsbury Pavement, London, E.C. I have used these incubators for many years, and when under my own control have always obtained excellent results from them. I have also used the following incubators—Spratt's, Tamlin's, Phipp's, Gloucester, and Stephens'. I found the Gloucester 150-egg size very good, and find their self-turning tray reliable and good. I used a Tamlin 60 hot-water incubator for several seasons. I found it small for my purpose, but the hatching results were excellent.

The results obtained from incubators and foster-mothers when they are worked by several people cannot be taken as any criterion of their merit. Really satisfactory results will be obtained only when they have been entirely run under the control of one person.

Foster-mothers.—My foster-mothers are made by Stephens of Gloucester and Randolf Meech, Poole. For many years I have bought goods from R. Meech, and have always found them surprisingly cheap and wonderfully good.

My remarks with regard to incubators also apply to foster-mothers.

Personally I prefer R. Meech's old type of brooder to his new.

Spare Lamps and Fittings.—John B. Everall & Co., Battersea Works, Hayes, Middlesex.

Wire-netting.—I have bought wire-netting from many firms, but can find none as good as that I obtain from Tamlin, of St. Margaret's Works, Twickenham, London.

Posts.—It is best to buy these locally from a local timber merchant. I usually pay about ¾d. each for mine, but have bought them as low as ½d. The bark should be peeled off, the wood creosoted, and their points dipped in tar well above the point where they are to be driven into the ground.

Bamboos. — (For the little chicken runs.) I usually buy these from Messrs. Woods, Horticultural Merchants, Wood Green Station, London, N.

Nest-boxes.—These were specially made for me to be used in conjunction with night arks, by R. Meech.

Dropping-boards.—These were specially made for me to slip under the night arks by Horace Stephens of Gloucester.

Broody Coops.—These are the same as ordinary fatting coops, and were made by Messrs. Haffenden, Poultry Appliance Makers, near Heathfield, Sussex.

Egg-boxes.—Robinson's Patents, 332 Goswell Road, London, E.C.

Cramming Machine.—Neve Brothers, Poultry Appliance Makers, Heathfield, Sussex.

Pens, Shaping Presses, and Fatting Coops.—Messrs. Haffenden, of Heathfield.

Watering-pans.—Ordinary 12-inch galvanised iron wash-ups which could be bought at any local ironmonger before the war for about 6½d. each.

Grit-pans.—These are also just 12-inch galvanised iron wash-ups, with holes in their bottoms to let out the rain-water, screwed on to a wooden platform, made up of two pieces of wood 16 inches by 2 inches by ⅞ths, let into one another cross-ways.

Food-tins.—These are 12-inch round tins, which cost before the war 3½d. each, over which is fixed a wire guard, and they are then screwed on to platforms in the same way as the grit-pans.

Sussex Ground Oats.—These were bought from Messrs. Arnold, Banbridge Mills, Paddock Wood, Kent. Before the war they cost from £8 to £10 per ton.

Fat for Fatting.—This was bought from H. Botting, General Merchant, The Stores, Church Street, Uckfield, Sussex. It cost about 36s. per cwt.

Milk for Fatting (condensed).—The Anglo-Swiss Milk Company, 6 and 8 Eastcheap, London.

Meat for Laying Birds.—Messrs. Spratts, Fenchurch Street, London. It is very important to buy one's meat of a thoroughly reliable brand. I have tried many firms, but have found none as good or as reliable for this commodity as Messrs. Spratts. Messrs. Spratts buy very large quantities of meat for their dog biscuits, and therefore, being in the trade in a large way, are able to sell the very best quality at a reasonable price.

Chicken Meal.—I mix my own, but if people wish to buy I believe Messrs. Spratts is very good.

Biscuit Dust.—I also buy this from Messrs. Spratts.

I buy it by the ton and therefore get it at wholesale prices.

Fish Meal.—I do not recommend fish meal for little chickens, but it does very well for laying hens, and has the advantage of being cheaper than the best meat. The best known and most reliable brand is that sold by Mr. G. A. Palmer, Wykin, Hinckley.

I understand that in the laying competitions Palmer's fish meal is used almost exclusively, which speaks for itself.

Chick Feed.—I prefer to mix this myself, but when I have not time to do so, I buy Messrs. Armitage's best quality. Their address is Poultry Food Specialists, Nottingham.

Preserved Meat for Little Chickens.—This I also buy from Messrs. Armitage.

Flint Grit.—I find Messrs. Tamlin, of Twickenham, keep excellent flint grit, always of a sharp uniform quality, and I buy mine almost exclusively from them, also my oyster shell. I find it is very important to have flint grit really sharp. There is a great deal on the market which is not nearly sharp enough.

Conkey's Roup Cure from Finch & Fleming, Pulloxhill, Ampthill, Beds.

Izal.—Messrs. Newton & Chambers, Thorncliffe, near Sheffield.

Other Medicines.—These can all be bought at any chemists. The Epsom salts and cod liver oil are crude, *i.e.* not fit for human consumption.

Creosote. — Boulton & Haywood, 64 Cannon Street, E.C.

Paraffin. — The cheapest quality I could buy locally.

CHAPTER VIII

Experiments Needed

MEMBERS of the Board of Agriculture and Fisheries and others during the past four years have repeatedly asked me, " What do you think should be done in order to rapidly develop the poultry industry from the point of view of the production of table poultry and eggs, that is, the production of an important branch of our food supply ? " And my answer has invariably been, " The right thing for you to do is to erect a model small-holding in a favourable situation on thirteen acres or so of dry old grass land, within a mile of a railway station, and within thirty miles of the proposed marketing centre. Everything should be arranged on this small-holding to produce the GREATEST POSSIBLE PROFIT with the least possible expenditure of capital and labour."

No matter where table poultry is produced in England, it will cost for raw material, that is for food, eggs, and oil, about the same. These charges are fixed and cannot be very much altered; the food charge, which is the largest, being chiefly controlled by the ruling price of wheat and oats. The other standing charges, however, can, to some extent, be controlled by selecting a suitable situation near a station and the proposed marketing centre, and designing the general arrangement of the holding so as to reduce the labour to a minimum.

The selling price may vary to a certain extent, but provided the birds are sent to large centres, such as London, Liverpool, Manchester, etc., and the birds are uniformly of the very best quality, the variation in price will not be great.

In order to explain my meaning I have drawn up a balance-sheet showing exactly what the various charges to produce a table chicken about 4 lb. weight should be, when the work has been conducted by a small-holder under the best, *i.e.* properly selected conditions. Each item has been carefully thought out, and I do not think any practical man will dispute any of them except in so far that he may say he can do much better.

I take as my basis that all the birds are to be Buff Orpingtons, as this breed, although it can be improved by judicious crossing with such breeds as Indian Game, Faverolle, Dorking, Sussex, etc., is, I believe, the best as a pure breed for commercial table purposes.

In the balance-sheet I estimate that each chicken should cost for raw material as follows in normal times :

	s.	*d.*
For food . . .	1	5⅛
For eggs . . .	0	5
For oil . . .	0	0¾
	1	10⅞

and sell when from 3½ to 4 lbs. at an average price of 3s. 2½d., including value of manure collected and sold (½d.), free of transport to station and commission charges. This leaves a margin of 1s. 3⅝d. between the cost of the necessary raw material and the net selling price, which represents 1s. for the small-holder's labour and profit, and 3⅝d. to meet the other necessary standing charges. These charges on an output of 4000 chickens being :

Repairs, etc.	£7	2	8
Railway carriage at 1d. . . .	16	3	4
Rent (3 acres)	9	0	0
Miscellaneous	4	0	0
Depreciation	20	0	0
	£56	6	0

that is, 3⅝d.

Now, if the situation of the holding is such that the transport charge comes to 4¾d. per head, as it did during my 1915 experiments for the Government at Morden Hall, instead of 1d., as it should, then the small-holder's profit will be reduced by 25 per cent.

The situation of the holding should be most carefully selected so that the small-holder's balance of 1s. is not in any way unnecessarily encroached upon.

This balance-sheet, after ten years of practical experience, I confidently state is not by any means a fanciful one; and if it be a fact that a small-holder can, by rearing chickens for table purposes, that is for the production of a staple article of food, on such small areas of land, obtain such a financial result, surely it is worth an effort on the part of the Government to show him how to do so.

The poultry industry, as an industry from the point of view of the production of food for the people, can be quickly developed only by increasing the number of birds in the country, that is by more extensive rearing; and when this is done the other branches, that is egg production, fatting, and stock birds, will automatically right and develop themselves.

If such a 13-acre holding be once set on foot, and the results maintained and possibly improved upon over a sequence of years, then all the other branches would quickly right themselves.

In normal times there are thousands of people who, if they could be shown by the Government, by a practical paying illustration, how it is possible for them by their own individual efforts, on a capital of from £300 to £400, to earn £200 per year from such a thing in such a way, would be only too pleased to take up such work; and were many such people working on these lines, there would soon be a plentiful supply of pullets for egg-production, and cockerels for fatting, and a demand would be created at remunerative prices for stock birds' eggs. Until the rearing of chickens for market purposes can be reduced to standard and absolutely safe lines on a sufficiently large scale to support a small-holder and his family, so that it can be confidently recommended to them by the Government for such a purpose, nothing very much can be done, and therefore the success and rapid development of a huge industry may entirely depend upon such an experiment as the one I am describing being made.

Such an experiment would cost the country little or nothing.

The books should be kept by an accountant, and if at the end of the first season any of the charges, such as depreciation, transport, food, eggs, etc., are found to be in excess of the estimate, then plans should be made, and steps taken for the following season to remedy them. In three years the thing would certainly be done, and to all intents and purposes a new industry created.

If this experiment be once started the operator should not be asked or expected to try and kill, so to speak, several birds with the one stone, *i.e.* be hampered or bothered in any shape or form with visitors, demonstrations, lectures, pupils, unnecessary record-keeping, correspondence, etc. He should have only his work to think of and attend to and worry about, just as if he were really a small-holder out to make his living.

His cottage should be ready for him by the end of September, and he would then have two clear months to get things into order and together, and be ready, so to speak, at the crack of the pistol to start operations on December 1.

He should then be left quietly alone until the following September, when his accounts could be carefully and sympathetically gone into, and plans made for the following year to correct any of the items which may be found to have cost him more than what they ought to have done, according to the estimate, by purchasing for him more suitable appliances, altering his method of working or marketing, or in any way that experience has indicated to be helpful or necessary. By the end of three years all the faults, if any, would be corrected and the thing done.

Below I give a chicken-rearing balance-sheet, showing the results which may be confidently expected from a properly arranged, equipped, and suitably situated small-holding, run by a practical person on commercial lines for the purpose of chicken-rearing for table purposes. This balance-sheet represents an output of 4000 chickens per season, hatching out from December 1 to the end of May, or six months' work.

BALANCE-SHEET.

Dr.	£	s.	d.	*Approximately*			*Cr.*	£	s.	d.	
Food for 4000 chickens . .	£285	8	0	17.12d. or	1s. 5⅛d.	(*a*)	4000 chickens selling at an average price of 3s. 2d. each	£633	6	8	(*i*)
Eggs for 4000 chickens . .	83	6	10	5.00d. ,,	5d.	(*b*)	Manure, ½d. each	5	0	0	(*j*)
Oil for 4000 chickens . .	12	10	0	0.75d. ,,	¾d.	(*c*)					
Renewals for 4000 chickens . .	7	2	8	0.45d. ,,	½d.	(*d*)					
Carriage for 4000 chickens . .	16	13	4	1.00d. ,,	1d.	(*e*)					
Rent (3 acres) for 4000 chickens	9	0	0	0.54d. ,,	⅝d.	(*f*)					
Miscellaneous .	4	5	10	0.24d. ,,	¼d.	(*g*)					
Depreciation, 10 per cent on £200 for 4000 chickens . .	20	0	0	1.20d. ,,	1¼d.	(*h*)					
Profit . . .	200	0	0	12.00d. ,,	1s. 0 d.						
	£638	6	8	38.30d. ,,	3s. 2½d.			£638	6	8	

The capital required would be about £300. Land about 13 acres, 3 of which would be used each year for the poultry, and the remainder mown, used for cows, fed off with young stock, or used for some other purpose.

(*a*) This figure is based on the average of what the birds actually cost for food, under pre-war conditions, during my first three years' work, done under the observation of the Board of Agriculture, that is during 1913 at Hounslow, 1914 at Crewe, and 1915 at Morden Hall.

(*b*) I have estimated 2 eggs per chicken at a cost of 2½d. per egg. If the incubators and foster-mothers are handled exclusively by the small-holder himself, without any outside interference, he should easily accomplish this. During my first season's work under the Board's observation, my egg charge was 4d. per bird sold. At Alnwick in 1908 the cost was under 3d. per bird, and, therefore, I consider that 5d. in normal times should be quite sufficient to cover this charge.

The success of artificial rearing depends in a very great measure upon the amount of sympathy that exists between the operator and the chickens. If two or three people are responsible for them, much of the sympathy is lost. Rearing chickens is not a mechanical process; the sympathy and care of the mother-hen has been removed, and this must to some degree be replaced by the operator.

(*c*) This is an average of the oil charge during 1912, 1913, and 1914.

(*d*) This sum will allow for a barrel of creosote each year, new felts for the brooders and incubators, some new bamboos each year for the little chicken runs, replacement of posts, etc.

(*e*) This represents the carriage of the birds provided the farm is within 30 miles of the marketing centre. On many lines the rate for 30 miles and under is 1s. 7d. per cwt.; over 30 miles, 4s. 8d.; and as a hamper of 20 chickens weighs just about 1 cwt., this means that if the farm be situated within 30 miles the carriage will be 1d. per bird, and if over, 2¾d., which makes a difference of about £30 per year on an output of 4000 birds. If a producer has a large quantity of any particular articles to be sent regularly by rail, he can usually arrange with the railway company for a special rate, and this is an additional argument in favour of specialisation.

The farm should be situated within a mile or so of the railway station. The small-holder can easily spare half an hour or so in the middle of the day to run up his own birds, and would probably keep a rough pony or donkey turned out in one of his spare fields for this purpose.

(*f*) During my last season at Morden Hall I experimented by reducing the size of the runs so that they covered 3 acres only. This amount of land seemed to do quite well, and therefore I recommend this area; and as I prefer four changes of land, this represents 12 acres necessary together with 1 acre for the homesteading.

It would be very convenient if the dwelling-house could be situated right in the middle of the holding, as the birds would then be always under observation, close at hand. Such an arrangement would considerably lessen the labour, though it is not actually necessary.

The hay off the plots of ground not being used for the poultry should almost, if not quite, pay for the rent of the holding. At Morden Hall the effect of the poultry manure was that it more than doubled the hay crop. On one piece of land on which the poultry had been running we weighed the hay the following year, and there were nearly three tons to the acre.

(*g*) This will cover bank charges, travelling, and small incidental expenses.

(*h*) As I use only night arks for the housing, which stand on legs 9 inches off the ground, their life is very long. In Sussex this type of house is reckoned to last for from twenty to thirty years. I creosote mine inside and out, yearly. The foster-mothers are also creosoted inside and out. I do not like felt on the lids of the foster-mothers, because although at first it keeps out the wet, yet in time the wet gets under and rots the wood.

A tarred false bottom should be nailed on to the bottom of the foster-mothers. If proper precautions are taken, which is not often the case with poultry appliances, there is no reason why the depreciation on a poultry plant should be greater than 10 per cent.

(*i*) Almost any salesman or large shop would be only too glad to guarantee to give 3s. 2d. per bird for a steady supply of high-class table birds, such as Buff Orpingtons, averaging from 3½ to 4 lbs. weight throughout the season from April to September.

(*j*) The manure is estimated as being sold for £1 per ton. In many places, however, if kept under cover, it will realise £3 per ton or more.

Another experiment I sketched out for the Board of Agriculture and Fisheries was that they should let me house, run, and manage 2000 laying birds in the way we did the 1000 birds at Morden Hall in 1915. I believe such an experiment would have shown a small-holder a profit of about £500 per year on a capital of £600 to £700 on 16 acres of land.

Such an undertaking would have just comfortably filled up the time of a small-holder and his boy. They would have had nothing to do with the replacing of the stock (I would have looked after this myself) ; all they would have had to do would have been to look after the birds and see to the picking up and despatching of the eggs. Although this would probably have been more profitable, yet it was not nearly so important an experiment as the chicken-rearing one, but it would have thrown light on many interesting points. It would have shown whether it was preferable to sell off the whole of the stock each year and replace with pullets, or whether it would have been better to have retained a thousand each year, to be used as second season birds for producing hatching eggs.

It might have given an excellent illustration of a stock bird station, run on commercial lines with a minimum of expense and labour.

It would have shown the price obtainable for eggs on the wholesale market, when there was a steady supply of 500 upwards daily throughout the year.

It would have proved whether it is better for a small-holder to specialise in one branch of husbandry alone, so as to have a sufficient quantity of produce to become his own forwarding agent, or to go into several branches, and therefore perhaps have to depend upon a collecting depot for the sale of his produce.

Salesmen take a much greater interest in a person if they can expect from him a regular daily supply of a certain commodity than when the supply is irregular and spasmodic.

If a small-holder goes into too many branches then he has not a sufficient quantity of any one commodity to greatly interest a salesman, or to forward his own goods in bulk, and therefore has to fall back upon the collecting depot system.

If it can be proved that a small-holder, by specialising, can obtain much better prices taking the season through, and therefore secure a better profit than by dabbling in many, the authorities will know better how to direct them.

I have tried as a small-holder all methods of marketing, and my personal experience has been that from the small-holder's point of view the collecting depot system was by no means the best. This may have been because I specialised as a large producer, my produce was better than other people's, and I had made a study of the markets and market requirements and therefore knew them well, and could consequently dispose of my produce to better advantage than the collecting depot.

Collecting depots may be necessary to small-holders in Ireland, Wales, and isolated parts of England and Scotland, but all new small-holder colonies should have their situations selected with the view of easy marketing, and making collecting depots unnecessary. The selection of a situation for such a colony is much the same as the selecting of a situation for a shop. If the situation be wrong it will not pay; both should be selected with the same object—the ready sale of the particular wares.

Marketing one's own produce is not time wasted, it is the most interesting portion of a small-holder's work, and is in fact the salt of his existence. It sharpens his wits and opens up new fields of activity, and without it he would have very little pleasure in life, and his outlook would be very much narrowed.

If enquiries are made, I think it will be found that whenever small-holders are situated near a large town, or within easy reach of one, they very soon find markets for their eggs, butter, chickens, and other small-holder produce, and obtain better prices for these than the collecting depot could obtain for them.

The secret of selling eggs to advantage is to have a regular supply, market them oneself, and see that they get to the market absolutely fresh.

Another experiment I sketched out for them was to let me hatch out 50 pullets, heavy breed, such as Orpington, at the beginning of each month—50 at the beginning of January, 50 at the beginning of February, and so on up to June.

Then place these pullets into separate lots, and keep a careful record of their performance as egg-producers from the point of view of money-earners.

There is no doubt that the month in which pullets are hatched has a decided effect on their results from the profit or loss point of view.

If pullets are to be kept for one year only, then the month in which they are hatched is an important factor. I do not know, but I expect, which is against the general belief, that the January hatched birds will be found by the following September year to have been the most profitable. If a bird lays the bulk of her eggs when eggs are 2d. each, she is bound to be more profitable than one that lays the bulk of her eggs when they are 1d. each.

The above experiment would, if made, have given some interesting and instructive information, and I badly wanted the Board of Agriculture and Fisheries to let me make it.

Another experiment I sketched out for them was to take a 400-egg hot-air incubator, a 300, a 200, a 100, and a 60, also a 200 hot-water incubator, a 100 and a 60, and place them all together in one room, under exactly similar conditions; then get eggs, as near one quality as possible, and place them in the incubators, so that they all hatched out on or about the first of each month, from December 1 to July 1, and find out whether the size and type of the machine has an effect on the hatching results. The result of each machine could then have been worked out at the rate of per 60 eggs.

There is a feeling in the minds of people who have used incubators for any considerable length of time that the size and type of the machine have an effect on the hatching results, and authoritative information on this point is needed.

Another experiment I sketched out for them was to take a dozen pullets and house them in the best and most sheltered houses known; then take a dozen and put them in night arks; then a dozen and give them merely perches, out in the open with a roof over the top; then a dozen and put them into an open run with only perches and no roof, and watch the results. This would have made a most interesting experiment from the point of view of the housing question.

Agricultural progress seems to me to be drifting to two extremes. On the one side it is drifting towards the large capitalist farmer, who may farm from 2000 to 3000 acres, doing as much of the work as possible by mechanical means and employing a considerable amount of skilled labour; and on the other hand it is drifting towards the small farmer or small-holder on from 10 to 20 acres of land, employing little or no labour and doing the work almost entirely himself with the help of his family.

Both groups should work on systematic lines, in that they should have examples of well-tried plans and schemes of operation to follow.

The small-holder who probably wishes to market his produce daily should be situated near a railway station, so that he may become his own forwarding agent, and not have to rely on a collecting depot for the sale of his produce, whereas the large farmer who sells his produce in bulk, and at longer intervals, may be situated much farther afield.

The small-holder should not spend his energies on branches of agriculture, such as tillage, which would be much better left to the large agriculturist, but should be taught to devote his attention to those minor branches of agriculture which will pay him best when the work has to be conducted under small-holder conditions, *i.e.* so to speak, on the home paddocks.

He should be shown how, by the application of suitable combinations of appliances, methods, and systems, and by concentrating on one or two of the lesser branches of agriculture, better profits can be obtained by him than by his dabbling in the larger, or in dividing his attention amongst too many of the smaller.

The individual effort should be encouraged and developed to its utmost extent, and experiments should be made with the object of ascertaining through which channels and by which appliances, methods, and systems, the individual effort can produce the best financial results.

Small-holders should be introduced to reliable salesmen in the large centres, so that they may treat with them themselves and sell their produce direct, and not have to depend upon collecting depots, thus keeping in their own hands the sale and good-will of their own produce.

Small-holders should be an absolutely independent type of people, and not be made, as sometimes seems to me to be the tendency, into a sort of modern serf. They should be taught to depend upon themselves and their own initiative entirely, both as regards the production of their produce and the sale thereof. They should be taught to depend upon their own initiative and individual effort much in the same way that fishermen on the coast depend upon theirs. Coast fishermen and small-holders should be much the same independent type of people, the one obtaining his livelihood from the sea by means of his boat and his nets, and the other from the land by means of his holding, appliances, and live-stock. Small-holders should be taught to dispose of their produce in the same manner that these fishermen now dispose of theirs.

If an ordinary farmer is asked for the use of his home paddocks, he will say that these are the most valuable portions of his farm, and worth to him perhaps from £4 to £6 per acre, whereas the other portions, owing to their being farther afield, may not be worth to him more than from 30s. to £2.

Small-holder schemes should take the fullest advantage of this fact, all the small-holder's land should be home paddocks, and be of additional value as such; the small-holder's house, in order to take the fullest advantage of this, should therefore stand by itself as a separate unit with its own little farm-steading. They should not be built in pairs as is now sometimes done, because this reduces the value of the surrounding land, and impairs the independence, privacy, and efficiency of the worker. He should grow as much food as possible in the shape of vegetables, fruit, eggs, milk, butter, honey, etc., to satisfy his own home requirements, and should devote the rest of his time to those branches of petty agriculture which are best adapted to the individualistic effort and for farmyard and home-paddock work, such as calf-rearing, pig-keeping, fancy-cheese making, egg production, table-bird production, ducks, turkeys, rabbits, bees, goats, etc., specialising in one or two, rather than taking up too many.

The land for such a colony of small-holders should abut on to a main line, on which a small station (halt) should be built with the holdings all clustering closely around the station. Such a colony should be as close as possible, and not more than thirty miles from a large centre, such as London, Manchester, Liverpool, Leeds, Newcastle, Sheffield, etc.; and the small-holders should have cheap travelling facilities given them, so that they may personally interview their salesmen and be able to get to the large town cheaply, quickly, and easily for shopping, the education of their children, doctors, recreation, etc.

Scientific instruction, that is, how to conduct operations on well-tried plans, is quite as important to the small-holder as to the big farmer, but his instruction must necessarily follow different lines; the one must have the object of developing the individual effort, and the other the development of the effort of paid labour; and the economic knowledge now so badly wanted in both directions can best be obtained by the Government having their own commercial test holdings.

CHAPTER IX

Useful Hints

STOCK BIRDS

1. AVOID in-breeding; it promotes disease.

2. It is unwise to use pullets for breeding purposes before March.

3. For December, January, and February rearing, the eggs of second or third season hens are best.

4. It is unwise to use males when more than two years old.

5. Cockerels at times, though personally I have not found it necessary, may require feeding apart from the hens, as otherwise they may not eat sufficient.

6. Immediately the breeding season is over remove the male birds.

7. It is a mistake to use high perches.

8. Line-breeding is a modified form of in-breeding, and is followed by those wishing to retain some characteristic feature of a flock; it is not to be recommended for ordinary commercial purposes.

9. Strain-breeding is breeding with the object of fixing a characteristic, that is producing either a good-laying strain or fine-plumaged birds, and is a lengthy and difficult operation.

10. Cross-breeding is mating pure-bred birds of different breeds, which spoils their feather but improves their strength and stamina, and is the correct thing to do for table purposes.

11. Single-mating means mating pure breeds selected to produce superior males or females for exhibition purposes. It may also be used for commercial work in order to produce better parent birds either for layers or table birds.

12. Double-mating means selecting both parents with the one object; each bird is chosen because it has a distinctive feature, making each parent likely to produce, in the one case, extra fine males, or in the other case, extra fine females for exhibition purposes.

ON ARTIFICIAL INCUBATION

1. The best hatches will always be obtained when the eggs are set on the same day that they are laid.

2. Eggs intended for hatching should always be kept standing on end with the small ends down.

3. Incubators are either of the diffusion (hot air) or radiation (hot water) type.

4. Incubator thermometers may alter, and therefore should be occasionally tested.

5. The temperature under sitting hens varies from 96° to 105°.

6. The temperature in an incubator when between 102° and 103° is normal. If the temperature goes above 103° the hatch will be hastened, and if under 103° it will be retarded. Temperatures over 106° and under 99° are injurious, and if prolonged will partially or totally destroy the hatch.

7. Always regulate the incubator before putting in the eggs, then allow it to cool, and reheat with the eggs in. Heating the eggs too rapidly by placing them in a hot incubator is injurious.

8. Make a rule of putting in a new wick for each successive hatch.

9. To produce good results incubators must be absolutely level.

10. Always turn the eggs before filling the lamp.

11. Incubator lamps must be regularly filled and carefully trimmed.

12. Keep your incubators and the little chickens during the first fortnight of their lives under your personal care. The personal factor here counts enormously, and if the control is divided this in itself may make all the difference between the success or non-success of your effort.

13. It has not to my knowledge been authoritatively proved which type of incubator, the hot-water

or hot-air, gives the most satisfactory results from an investment point of view.

14. The vitality of the chicken hatched is of not less importance than the fertility of the eggs.

15. Stock birds of low vitality will not produce chickens with high vitality.

16. To get the best results eggs set in an incubator should be as nearly one age as possible, and the eggs should all be set at one time and not at intervals. Do not put in an incubator eggs you would not set under a hen.

17. Eggs should be tested on the seventh day, and again on the fourteenth.

18. Eggs may be tested by means of a hole cut in a piece of brown paper and then held to a candle lamp, or gas jet.

19. Unfertile eggs when hard boiled make an excellent food for little chickens.

20. Natural brooding means hatching with hens.

21. Artificial brooding means hatching with incubators, and rearing the chickens by means of foster-mothers.

22. Hens usually leave their chickens when from 6 to 8 weeks old. In artificial brooding it is therefore unwise to wean the little chickens too young, 6 to 8 weeks is early enough.

23. Eggs for artificial incubation should not be over 1 week old and never over 2.

24. Clean up your incubator and re-regulate it as soon as the hatch is over.

25. Don't sell all your March eggs; hatch some for yourself for winter layers.

26. Do not use misshapen, too small, or too large eggs for incubation.

27. Do not open the incubator drawer until the third day after starting.

28. I always buy for my incubators and brooders a cheap grade of paraffin oil. I want heat and not light, and have not found sufficient benefit from the more expensive grades to justify my paying the extra cost.

29. Always closely follow in all things your incubator manufacturer's directions.

30. When the shells are "chipping," the egg drawer of your incubator should not be opened too often.

31. Keep your incubators as near 103° as possible. A higher temperature is worse than a lower.

32. Do not wash eggs to be used for setting, just rub off any dirt.

33. Be careful not to jar the eggs on your incubator trays.

34. Close the incubator door gently.

35. When using hot-air incubators do not use an unnecessarily high flame; try and regulate their heat to some extent by means of the flame.

36. Eggs which come by train or have otherwise

travelled should always be rested for twenty-four hours before being set.

37. In hot-water incubators put the water in the tray from the start, some people do so after the seventh day, but I believe it is better to do so from the first.

38. Place a mark on your eggs so that all the marks may be turned down in the morning and up in the evening ; eggs require turning twice daily.

ON NATURAL INCUBATION

1. Orpingtons make the best mothers. Faverolles, Wyandottes, Rocks, and Rhode Islands are also good mothers. Heavy leggy birds, such as Langshans, are bad mothers.

2. If the hen is covered with vermin her chickens will also be verminous. Give the hen a good dusting with insect powder. Pyrethrum is the best insecticide for dusting hens.

3. Do not use a broody hen twice in succession, their temperature will be too low ; moreover, it is cruel.

4. Do not breed from a bird that has had roup.

5. Do not set your hens in a flat-bottomed box. Try and make some kind of nest for her ; a bottomless coop is best with a depression scouped out of the earth.

6. Hay is the best substance to use for her nest. It is better than straw.

7. Do not put too many eggs under a hen, thirteen is enough.

8. From the middle of June to the middle of August is the worst time for incubation.

9. Sitting hens can be fed on maize with water and grit.

10. The day after the chickens are hatched they should be fed every two hours on a little Armitage's dry chick-feed.

11. When five to six days old they may be given, in addition to the chick-feed, at 9 and 1, a little boiled egg and bread crumbs.

12. During their second week they should be given for their first meal as many groats as they will eat; egg about 9, chick-feed about 11, egg again about 1, chick-feed about 3, and again as their last meal.

13. Bread and milk and rice pudding may be substituted at any time with benefit for any of their meals, with the exception of their last grain feed.

14. During their third week give groats for their first meal, then chick-feed, then groats and chick-feed during the remainder of the day. A little of their mother's soft food will do them good, and they may eat with advantage some of her wheat.

15. After the third week they may be given whole wheat, a few groats, and the same meal that the mother hen is being fed on.

16. It is generally admitted that better hatching

results are obtained by natural than by artificial incubation. Although I believe it has never been actually proven, yet many people think that this is brought about by the pores of the egg-shells in natural incubation becoming gradually closed by means of a kind of grease received from the hen's feathers and body. Evaporation is thus gradually retarded, and better hatching results obtained than what is possible by artificial means.

On Artificial Chicken-Rearing

1. A table-bird rearing farm should not be situated on low-lying ground. Young chickens in the spring do best on the side of a hill.

2. Milk is an excellent food for little chickens, and should always be given during the first few weeks of their lives when obtainable at a reasonable price.

3. Unconsumed food should never be left with little chickens ; clear it away immediately they are satisfied.

4. Never mix hen-hatched chickens with incubator-hatched, as they may have grey ticks and other parasites. I have spoilt a season's work by so doing.

5. Lettuces hung up in brooders make the best green food for little chickens.

6. Chickens should have no food for about thirty-six hours after hatching.

7. Chickens should have grit from the first day.

8. The fewer chickens there are in a brooder the better they will do. This also applies to the houses. I put in 60, but 40 would be better.

9. The day before chickens are hatched the brooder should be heated up to the proper temperature.

10. Newly hatched chickens once chilled are seriously injured, and if overheated they lose their vitality.

11. About 85° is the best heat for little chickens to start with. If the heat at any time falls as low as 60°, and remains at this heat for any length of time, they will be seriously injured.

12. For artificial brooding the foster-mothers should be so designed that the little chickens at night can get away from the source of heat into a cooler atmosphere.

13. I do not recommend fireless brooders because ventilation is as important to little chickens as heat.

14. Brooders should be creosoted inside and out yearly. July and August are the best months for doing this.

15. Buff-coloured chickens seem to have more stamina than chickens of any other colour.

16. Too much millet is bad for little chickens, but up to 20 per cent in their chick-feed is good. There are several kinds of millet. I like the white best.

17. The best seed for little chickens is canary seed.

It should be used for the first two or three weeks in conjunction with other small grains.

18. Wheat is the best grain for growing chickens, but is not in itself a perfect ration. As the birds approach maturity, that is after ten to twelve weeks, they require the addition of a more fatting grain, such as maize.

19. Do not keep pullets and cockerels running together after they are twelve weeks old; it retards their growth and reduces your profit.

20. Do not keep cockerels after they are four months old. If reared for the purpose of killing it will pay you better to sell them when four months old than five months.

21. I always place my foster-mothers with their backs to the sun and their little doorway facing the west.

22. I give my little chickens water to drink from the first day.

23. Guinea-fowls will cry out at the sight of a hawk and thus raise the alarm.

On Eggs

1. Langshans lay the darkest coloured eggs and Leghorns the whitest.

2. Marketable eggs should weigh not less than 2 ounces each.

3. When washing eggs for market purposes put a little ammonia in the water.

4. Pullets hatched in March should start to lay about the following August; pullets hatched in August may not start to lay before the following March.

5. An important controlling factor as to whether pullets will be profitable or not is the month in which they are hatched.

6. Do not be afraid to hatch your pullets too early, but be very frightened about hatching them too late.

7. To obtain the best prices eggs must be graded, and be marketed in a fresh, clean condition; 30-dozen crates for marketing are the best size to use.

8. Eggs on the London market are sold by the long hundred, that is, 120.

9. If possible put all the brown eggs in one lot and white eggs in another. Brown eggs if packed by themselves fetch better prices than mixed or white.

10. Do not keep hens over three years old; it is best to get rid of them when two years, and better still after one.

11. Get rid of hens which eat their eggs; it is almost impossible to cure them of so doing.

12. Hens which constantly lay double-yoke eggs usually die from ovary trouble.

13. Do not use high nest-boxes, a nest on the ground is safest.

14. If the egg-shells are thin give more bran,

and see that there is a plentiful supply of oyster shell.

15. Do not give broken glass instead of grit. Broken earthenware will do, but flint is better.

16. Do not use wheat or maize alone for any length of time. If it be desired to feed entirely on grain, it is best to use half oats and half maize.

17. If it be desired to use entirely soft food, the best meal for this purpose is Sussex ground oats, or half-ground oats and half middlings. If the birds have not free range they must be given, in addition, some meat or fish meal.

18. A ration made up of half soft food and half grain is better than one of entirely grain, or entirely soft food.

19. Fowls require a great deal of water; the flesh of fowls and eggs is from 45 to 60 per cent water.

20. Ducks' eggs do not keep well either in water-glass or in lime.

21. April eggs are best for pickling; eggs in this month are in their primest condition.

22. Infertile eggs keep better than fertile. Eggs to be put down in water-glass should all be infertile and absolutely fresh.

23. Seasons have an effect on the quality of eggs as well as foods.

24. Eggs may be preserved in lime-water as follows: 1 quart of unslaked lime, 1 lb. of salt, 2

gallons of water. This mixture should be made up a few days before being required, and stirred at intervals. Some people boil it, stirring well whilst boiling. The eggs should then be placed in an earthenware vessel with their small ends down, and the above mixture when cold poured over them. The eggs should be well covered with the mixture, and the jar stowed away in a cellar or other cool place.

25. Instead of lime-water, silicate of soda may be used (water-glass)—one gallon of water-glass to 9 gallons of water, the water-glass being first dissolved in hot water. This mixture when cold should be poured over the eggs in the same manner as the lime. Great care should be taken that the water-glass is of the best quality, as some sold is much weaker than others, when it requires less water. Eggs when taken out of the water-glass should be thoroughly washed before being used.

26. Grass runs, if for permanent runs, should not be less than 100 square feet per bird.

27. Fifty per cent of an egg is white, 39 per cent yoke, and 11 per cent shell.

28. Breeds of European origin mostly lay white-shelled or tinted eggs, and of Asiatic dark-shelled eggs.

29. Do not hatch late in the season, as the pullets will lack stamina.

30. Do not keep moving your birds about from pen to pen; it unsettles them.

31. Nest-boxes should not be less than 12 inches square.

32. Gather all eggs daily, and market them within twenty-four hours.

33. Do not frighten laying hens, as, if once frightened, they take a long time to recover.

34. Heavy-combed hens are usually not as good layers as light-combed. An experienced person can often tell a good layer from a bad by the shape of its head and comb.

35. Be careful as to what packing you use for your eggs, as if musty it may taint them.

36. Keep all eggs away from paraffin as it taints them.

37. The following breeds lay brown or tinted eggs: Orpingtons, Wyandottes, Faverolles, Plymouth Rocks, Sussex, Rhode Islands, Indian Game, Langshans, Jarvas, Cochins, Dominiques, Brahmas.

38. The following breeds lay white eggs: Leghorns, Campines, Houdans, Anconas, Andalusians, Hamburgs, La Fleche, Minorcas, Polish, Red Caps, Spanish, Creve Cœurs, and Dorkings.

These two lists include practically all the best known utility breeds of fowls.

On Fatting and Killing

1. Do not attempt to cram chickens without using some fat.

2. Do not send your birds to market the same day

as they are killed. Keep them back for twenty-four hours to thoroughly cool.

3. In the hot weather draw out their entrails through the vent, and rinse them well out with a weak solution of permanganate of potash.

4. Always send your dead birds, whether crammed or not, to market in peds (proper boxes made for the purpose).

5. Indian Game and Dorkings make the best cross-bred birds when fatted, but are not as profitable to produce as the following pure breeds: Orpington, Sussex, or Faverolle.

INTENSIVE POULTRY-KEEPING

1. Intensive poultry-keeping means keeping poultry in confinement without a grass run.

2. Semi-intensive means having a grass run attached to the house and letting the birds out into it at times.

3. Intensive poultry-keeping and semi-intensive on a small scale pay exceedingly well.

4. All backyarders may be called intensive poultry-keepers.

5. If you have plenty of land do not take up intensive poultry-keeping, as extensive (*i.e.* keeping poultry either on free range or in large grass runs, as at Morden Hall) will pay you better, and requires less capital, time, and attention.

6. But if you have only a backyard or back-garden do not hesitate about taking up intensive work.

7. Intensive poultry-keepers must keep their birds scrupulously clean ; poultry under these conditions require much more personal attention than when run extensively.

8. The most suitable breeds for intensive work are Rhode Islands, Orpingtons, Wyandottes, or Leghorns.

9. Almost any of the advertised box type of houses are suitable for intensive work. The Board of Agriculture's special house, though too expensive and bulky for extensive work, yet is excellently designed for intensive or semi-intensive, and should be looked upon as a pattern or guide of what is required. Those thinking of keeping a few poultry for egg production, especially those in Group 3, should write to the Board for one of their pamphlets on this house. This house is illustrated further on (p. 154, No. 19).

10. In intensive work the soft food should always be fed in troughs and never allowed to lie about.

11. Intensive work lends itself to dry mash feeding. When feeding by this method the dry mash, oyster shell, and grit must be fed in hoppers.

12. When feeding wet mash do not leave the food before the birds for longer than half an hour at a time. When feeding dry mash feed grain in

the morning, and leave the dry mash before the birds all the afternoon.

13. All the grain should be deeply buried in the litter.

14. Do not allow the green food to lie about. Green food is essential and should be hung up at a convenient height for the birds to peck at. Mangels or turnips are best. If cabbage stalks and leaves are fed they should be hung up in a string bag.

15. Wheat straw makes good scratching material, but should be cleaned out every three to four weeks. Other good scratching material is cavings from threshing, cedar shavings, and wheat chaff.

16. It will pay small intensive poultry keepers best to buy country-bred pullets every year, and sell off their old birds each autumn.

17. A good dry mash for intensive work is middlings, one part ; ground oats, one part ; maize meal, one part ; bran, one part ; Alfalfa meal, one part ; beef scrap, one part.

18. The best grain feed is one part wheat, one part oats, and during cold weather one-third maize.

19. A good soft food the same as I give to my laying hens.

ON FOODS

1. Middlings is the most useful and most easily procurable meal for poultry feeding. It is a by-product of the manufacture of flour ; the

outer skin of wheat is bran, then comes pollard, then thirds, sometimes called sharps or middlings, then fine middlings, then flour, and then the heart or germ. Some millers make only flour and what they call "dan," that is, all the by-products, bran, pollard, middlings, and germ, mixed together. Middlings as now sold is a very variable commodity, and care must be taken that it is not too much of a brany nature.

2. Wheat is the most valuable of the grains for poultry feeding, but it must not be fed continuously by itself. A grain ration of two parts wheat, one part oats, one part maize is excellent.

3. Whole oats sometimes vary in weight from 25 to 50 lb. per bushel. When light they are unsuitable for poultry food, whereas when heavy there is nothing better, with the exception of wheat. When buying oats ask for heavy-weight clipped oats. Ground oats, as ground in Sussex, is the best pure meal to use by itself. In Sussex it is almost exclusively used both for fatting and for chicken-rearing.

4. Oatmeal and groats are splendid chicken food. I prefer groats to oatmeal. It must not be overlooked that immediately a grain is crushed it is killed and deterioration soon sets in. When being artificially reared, groats and oatmeal must not be fed to young chickens in excess. I find one full meal per day sufficient.

5. Maize is also a valuable food, but must not be used in excess. Mixed with oats it makes an excellently balanced ration for laying birds, the husks forming the roughage which is essential for maintaining health. If an entire grain ration is desired, one-half oats and one-half maize will do well. Some meat, however, should be supplied by means of a hopper, and this, with grit, oyster shell, and charcoal, should maintain the birds in good health.

6. Barley. I like barley for feeding poultry the least of all the grains, but combined with wheat it does as a change. I am a great believer in a little barley meal—about 15 per cent—mixed in with the middlings, both for hens, young chickens, and ducklings ; they seem to relish it and do better than on the middlings alone.

7. Peas. Some people use pea-meal mixed with bran as a soft food. At times I have used a few peas with the corn, but have never noticed any benefit from them.

8. Beans. At times I have used a little bean-meal, but also have noticed no benefit from it. Farmers who have it on hand use it extensively mixed in with their soft food.

9. Buckwheat. I have used it, but do not care for it.

10. Dari is a good grain, but if fed alone plenty of meat must be given. I have used it extensively, but personally prefer home-grown foods.

11. Rice. Boiled rice is good for little chickens as a change, especially if boiled in milk.

12. Wheat screenings, if they do not contain too many weed seeds, are a valuable food. I often buy excellent screenings at a low price from millers.

13. Good, plump, well-matured grains are better than stunted. Immature grains are often deficient in protein, and therefore, though their face value may be cheap, yet in reality they are dear.

14. An entire grain ration, especially of maize or barley, is often the cause of liver disease and should be avoided.

15. If the birds at any time look seedy stop all grain and meat for a day or two and feed on biscuit, bran, and middlings.

16. Mangels are the best vegetable as a substitute for grass. They should be cut in half when the birds will pick them out clean. There is nothing better for hens to take the place of grass from November to March.

17. Beetroot. The birds are very fond of beetroot, but it is not so good for them as mangels.

18. Turnips are not so good as mangels and they may flavour the eggs. Turnips and parsnips, when boiled, make a useful addition to the morning mash food.

19. Potatoes, if boiled and mixed in with soft food, are useful. If they have to be bought they are not a cheap food.

20. Cabbages. I have never found cabbages of much use. Sometimes the birds seem to like them and sometimes they don't.

21. Lucerne (Alfalfa). An excellent substitute for green food. It is much used by intensive poultry-keepers for mixing in with the soft food.

22. Onions. Poultry like them if cut up and boiled and mixed in with the soft food.

23. Meat scrap. Only the best meat scrap should be bought, a great deal sold has much too high a percentage of water and fat.

24. Dried blood. Takes the place of meat scrap, but in my opinion is not as good.

25. Green bone is made by cutting fresh bones into small pieces. It can be used in the place of meat scrap, but I prefer the scrap.

26. Fish meal. The best qualities are good for laying birds.

27. Poultry food should not be too concentrated. Poultry require a certain amount of roughage, such as bran, grass, or clover.

28. Do not use a ration too wide, and on the other hand do not make it too narrow. A medium ration of about 1 in 4½ is the best.

29. Biscuit meal in the soft food is not essential. A ration made up of four parts best middlings, one part bran, and half part meat meal by measure, mixed up with boiling water, makes an excellent soft food both for growing chickens, laying hens,

and stock birds. I used this mixture for many years with complete success.

30. When buying grain by the quarter make sure what weight you are actually getting.

31. Corn mixed in with so-called scratchings should never be bought.

32. Dressed wheat mixed in with poultry wheat or mixed corn is frequently a cause of trouble in the spring.

33. New wheat scours the birds. A supply of old wheat to last two or three months should always be obtained each summer before the new wheat comes on the market.

34. Always buy your middlings if possible direct from the mills. I always insist upon having freshly ground meals.

35. Charcoal assists digestion and may be given with the oyster shell and grit. Some people think it essential.

36. Do not mix your middlings with cold water. Always have the water absolutely boiling.

37. Do not give too much fish or meat meal. One-fifth of an ounce per head per day is ample.

Hints on Medicines and Disinfectants

1. If tempted to buy second-hand houses and foster-mothers always creosote them inside and out immediately on their arrival.

2. When buying second-hand brooders examine the felts for red mite, and if any are found boil the felts at once.

3. For the interior of brooders creosote is the best liquid insecticide. It may be diluted with paraffin oil, half and half.

4. I do not believe in, and do not use lime-wash for my poultry houses, coops, etc.

5. Lard is useful to anoint chickens' heads in cases of grey ticks; or for the same purpose a compound liquid made up of one ounce of aniseed and three ounces of sweet oil.

6. Roup is often caused by damp and badly ventilated houses. Night arks, although cold, are splendidly ventilated and always dry; they prevent roup.

MISCELLANEOUS HINTS

1. Poultry may be divided into classes: non-sitters and sitters.

2. The best known sitting breeds are Orpington, Wyandottes, Rhode Islands, Faverolles, and Sussex.

3. The best known non-sitting breeds are Leghorns, Anconas, Campines, Minorcas, Hamburgs, and Houdans.

4. Non-sitting birds are smaller than sitting birds.

5. Brown eggs produce the best table birds, whilst white eggs produce the best laying birds.

6. With one or two exceptions non-sitting birds lay white eggs, and sitting birds brown eggs.

7. It is almost impossible to ascertain the age of a fowl; this to a certain extent may be done by examining the scales of the legs and the down under wings, and cockerels by their spurs.

8. I do not use spice or stimulants of any kind.

9. A bushel of wheat in London weighs from 60 to 64 lb., oats 42 lb., maize 60 lb., barley 56 lb., barley meal 42 lb., middlings 32 lb., bran 17 lb., and ground oats 30 lb.

10. Eight bushels make 1 quarter, and 8 gallons or 32 quarts 1 bushel.

11. Do not expose the drinking water to the sun's rays more than you can help.

12. Never let the water become dirty in the pans. Clean them out and fill up with fresh water daily.

13. Do not feed tainted meat, or the flavour of the eggs may be spoilt.

14. Feed your birds liberally during the moulting period.

15. For all poultry work I much prefer an open field to an orchard or under trees.

16. Do not put too many birds into a house, especially if using the usual box type of house; in this type of house the birds should not have less than from 10 to 12 cubic feet of air space per bird.

17. Keep your poultry crates for sending the

birds to market in good repair ; see that they have good strong wood battens under their bottoms.

18. Do not use narrow perches. In night arks the birds' weight is distributed over several perches, and therefore their width does not matter.

19. I strongly recommend poultry farmers to have a brand made, and brand their surname and station on all their egg-boxes and crates, as otherwise they may lose them.

20. Do not use high poultry houses ; they are liable to be blown over, necessitate a lot of disinfecting, and are unnecessarily expensive.

21. The use of night arks with their narrow perches prevents cramp.

22. Always peel off the bark from your stakes and creosote them ; this lengthens their life considerably.

23. Primus stoves are the best for heating water.

24. Dowel pins cut into 6-inch lengths, sharpened at one end, with a nail bent over at the other, make excellent pegs.

25. Boil all incubator and foster-mother burners periodically, putting some soda in the water.

26. For table purposes the English markets prefer white-legged birds, and the American markets yellow-legged.

27. I prefer to sell my birds alive, but if it be desired to kill them on the spot, the best plan is to engage outside extra labour, paying 2d. per head for

so doing. If they are to be drawn and trussed, an addition of 2d. per head may have to be paid.

28. If trying to make your entire living out of poultry, go in for the wholesale market and do not bother about private trade.

29. When sending live poultry to market do not overcrowd. I use crates 36 inches by 24 inches, into which I put 18 birds.

30. Do your best to please your salesman and make a friend of him.

31. Do not keep changing your salesman. Find a good one, and stick to him, and he will then do his best for you.

32. In dressing fowls 33 per cent of their live weight is lost.

33. The best way to kill poultry is to dislocate their necks. This operation can only be properly understood by an ocular demonstration, and no one should attempt to do it without having first seen it done.

34. This also refers to trussing. A local poulterer is the best man to teach you.

35. Killing by sticking in the mouth is a nasty, dirty operation, and dislocation is much the better plan.

36. Birds should be plucked when still warm. The feathers should be separated by rubbing them up the wrong way. Operations should be started on the back and continued to the breast and body.

37. I do not recommend the practice of scalding before plucking.

38. Soft food should always be mixed by hand. If mixed by hand it is more palatable for the birds than if mixed by any other means, and the extra labour required is not great.

39. Both grain and soft food should always be fed either in troughs or tins so arranged that the birds cannot scatter it about, and any left over may be picked up.

40. Don't buy mixed lots of fowls. Some may be too old and some may have disease in a suppressed form.

41. Do not send old birds and young to market together, always grade your poultry as carefully as you grade your eggs.

42. Immediately you observe anything the matter with your birds do not delay, act at once.

43. Have sufficient birds to make your effort worth the time you intend to devote to it.

44. Put your capital into poultry purchased at commercial rates, and not into expensive poultry, poultry houses, and appliances.

45. Do not buy birds at uncommercial rates, and expect to make your living by selling their eggs and progeny at commercial rates.

46. Commercial prices are what eggs and table poultry fetch when sold by the salesman at the wholesale meat markets.

47. Do not feed late in the morning, always try and get the morning feed done before you have your own breakfast.

48. There are 4840 square yards in an imperial acre of land.

49. In London a quarter of wheat weighs 504 lb., oats 336 lb., maize 480 lb., and barley 448 lb.

50. Burn or bury at once all poultry that may die. Do not just throw their carcases on the manure heap.

51. When working on a restricted area scatter lime about at intervals, this freshens and cleanses the soil.

52. If you keep a poultryman, control him and do not let him control you.

53. Arrange your meals to suit your poultry's meals, and not your poultry's meals to suit yours.

54. Learn how to trap stoats. Stoats are worse than foxes.

55. Do not worry about foxes. I have worked for years in fox-hunting countries, and have never been troubled by them.

56. I do not keep watch-dogs. I count my birds weekly, and if I lose any at once offer a £10 reward in the local paper, which I find cheaper and better than keeping watch-dogs.

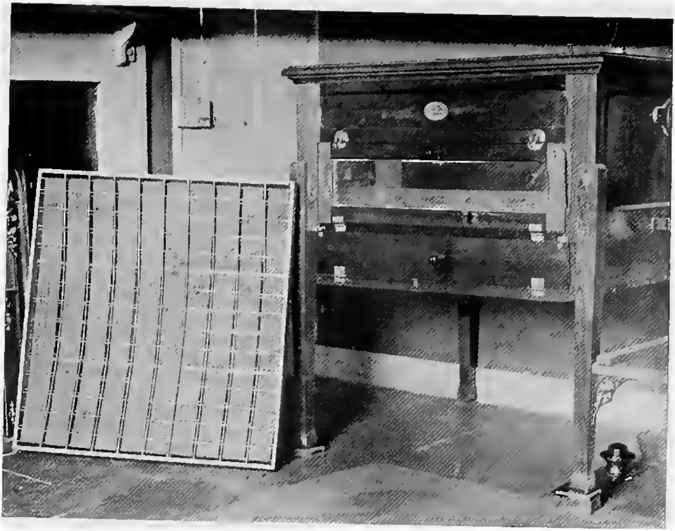
57. There is nothing mysterious in connection with poultry work.

ILLUSTRATIONS

No. 1 shows a 150-egg size hot-air Gloucester incubator. By its side an automatic egg-turning tray. This and the 240-egg size hot-air incubator are recommended for ladies, because when the trays of the 400 size are full of eggs they are much too heavy for ladies to easily or safely handle.

By using automatic egg-turning trays better hatching results are obtained owing to the fact that the eggs are turned more uniformly and with less jar. The time saved in turning is very considerable, and although the trays cost more, yet I believe they are well worth their extra cost.

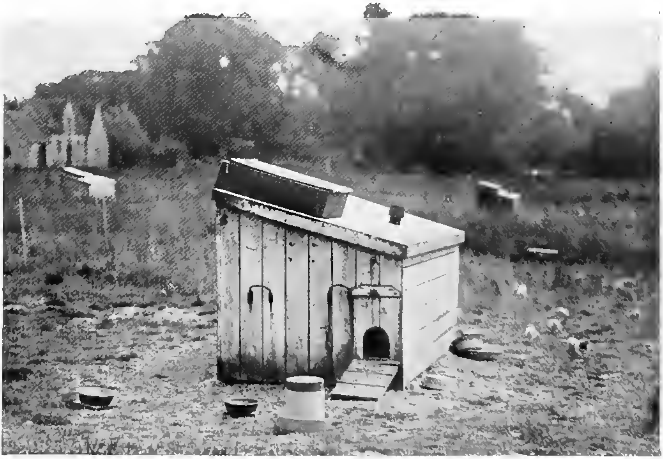
No. 2 illustrates two indoor brooders. If one has the space to spare, such as an empty spare room or outhouse, it is better to keep the little chickens indoors in indoor brooders for the first week or ten days of their lives. They should then be removed to brooders near the dwelling-house, as shown in No. 3, a short length of wire-netting being attached to the end of the brooder enclosing a small space of ground, which may be gradually enlarged as the chickens grow older. When they are between two and three weeks old they can be removed farther afield, as shown in illustrations 4 and 5.



No. 1

No. 2

No. 3



No. 4

No. 4 illustrates a brooder in which the heat comes from the top, and No. 5 a brooder in which the heat comes from the bottom.

Illustrations

No. 5 is much the cheaper type of brooder, and taking the season through, that is from Christmas to June, I have found it, on the whole, to be the more satisfactory. In No. 4, the box in which at 11 A.M. I stow away the food ready for the little chickens' evening and morning meals, is also shown the type of water-pot I use ; these I have specially made for me by Messrs. Spratts. They are earthenware and have flat tops, so that by turning them upside down they may be easily cleaned and filled. The small tins in which I place their soft food are also shown ; also some of the round guarded tins which I place in the boxes ready for the evening and morning feeds.

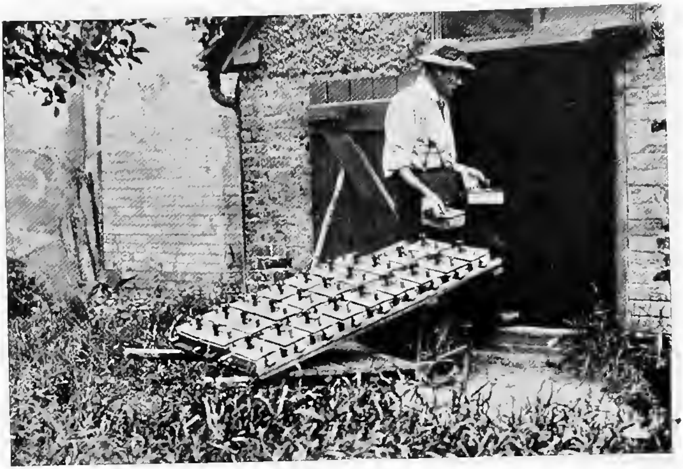
Nos. 6 and 7 illustrate my method of changing the brooder-lamps. I keep a double set in use, the full ones being taken out every morning, and the empty ones being brought back to the house to be refilled and trimmed at leisure. In No. 6 they are being taken into the house, and it will be seen that on the top of the barrow there is a board, which, on the barrow being lifted, becomes horizontal. This board is fitted with squares to hold 27 lamps. No. 6 clearly shows the whole barrow arrangement. I use two different sizes of burners, a ⅞th for cold weather, and a ⅜th for warm, or when the birds are growing older, and therefore require less heat.

I always thoroughly cut off the charred portion of the wick daily with a wick scissors, and do not just scrape off the char with a knife as many people do. I am very careful not to overfill the lamps, as years ago I had many accidents from this cause, and this is one of the most frequent causes of brooders catching fire.

When the chickens are from 6 to 8 weeks old, according to their size and time of year, they are removed to Sussex arks.

No. 5

No. 6



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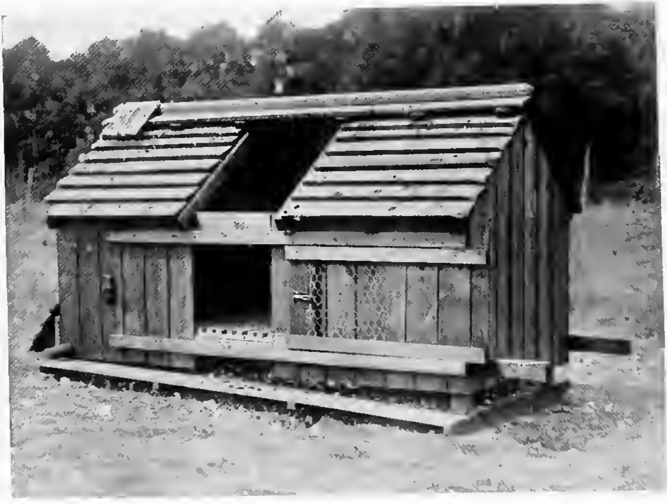


No. 8

No. 8 is a Sussex Night Ark.—In this illustration the slatted floor is clearly shown, also the dropping-board and ridge ventilation. The front door is made in two parts, one-half being boarded up and the other covered with wire-netting, so that the doorway may be fully or partially closed. A loose movable door fits in the gap seen in the roof. At one end of the house there are handles and at the other axles for wheels. The wheel in this illustration has been taken off; under the eaves, which overhang some inches, there is an air space of 1½ inches. These houses are very portable and never blow over; they last for years, and with their trap-doors off in summer time they will comfortably house up to 60 growing chickens, and although they are only 9 feet long by 2 feet 9 inches wide, I have often kept 60 chickens in them up to killing size, and in my opinion for commercial work they are the best *all-round* houses procurable.

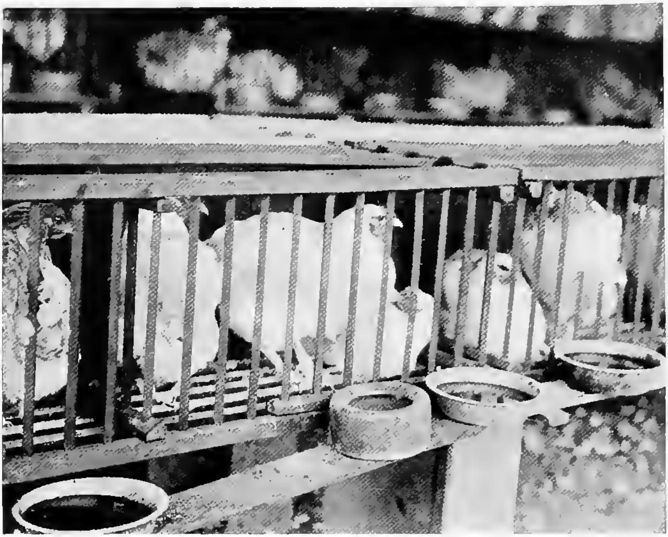
When the chickens are first put in them it is a good plan to cover the slats with sacks, which should be removed after a week to ten days, and meanwhile the droppings should be shaken off the sacks every few days. When this type of house is used in the open field, the front wheels will be kept on, no dropping-boards used, and the house moved to fresh ground daily.

No. 9 shows the feeding-tins piled up so as to sweeten and dry. This is done every time they are used. The soft food is mixed up in baths 2 feet 9 inches long, and the food is then packed in these tins, each bath making nine tins. A record is kept in a pocket-book of how many tins of food the various lots of chickens eat. When a brood of 60 chickens is first put into the runs they usually eat about one and a half tinfuls for their morning feed, and during the next six to eight weeks this quantity gradually increases to about six tinfuls, and as I usually have about thirty lots of chickens it is impossible to remember how much each lot exactly requires. The tins, of course, are not put into the runs, but their contents shaken out into a bucket, and then this quantity thrown to the birds. I found this method worked excellently. It saved a great deal of time, and owing to the birds being always fully fed without waste they grew more quickly and uniformly, and their flesh was produced at a cheaper rate. These tins are only ordinary bread-tins and cost before the war 4½d. each.

No. 10 shows one of the grain, water, and grit bins. They are just ordinary dust-bins. I had a number of these distributed about the field in convenient places, and found them a great saving of labour. In this illustration is also shown one of the 12-inch galvanised wash-ups used for the water and grit.

No. 9

No. 10



No 11

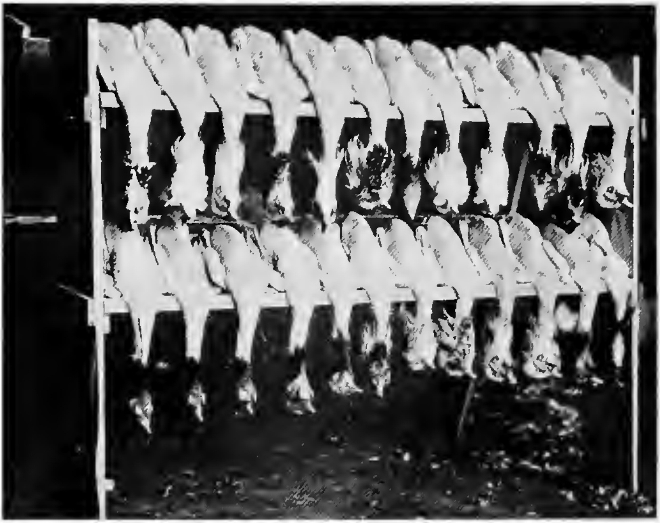
No. 12

When the birds weighed from 3½ to 4 lb. they were transferred to fatting coops, No. 11. In the illustration the birds are broody hens, but as I did not take sufficient photographs they serve to illustrate the point. These fatting coops have three divisions, and five birds are placed in a division. They cost about 6s. each. They were trough-fed in these coops for a little over a week and then crammed for about ten days.

No. 12 shows the process of cramming. In this illustration the bags containing the feathers are also shown, the wing and tail feathers are discarded and burnt, and the others sorted out, placed in bags and sold; each chicken yields about ½d. worth of feathers. After the birds have been crammed they are killed, plucked, and placed in presses, as shown in illustration 13.

The birds are placed breast downwards, and a board placed across their backs on which are heavy weights. These weights press them into shape, which when cold they retain. In the illustration the birds are shown after pressing, and are now ready for packing into the wooden cases called peds to be sent up to the market.

No. 14 shows a range of laying houses; these are just ordinary night arks, exactly similar to those used for the rearing.



No. 13

No. 14

No. 15

No. 16

No. 15 shows a nearer view of one of these houses; the temporary legs are clearly seen, also the dropping-board, and the air space between the dropping-board and the bottom of the house. The nest-box is also shown. I have now a better plan for nest-boxes, which are placed on legs against the back of the house, with a flap for collecting the eggs which saves stooping.

No. 16 shows the broodies. During May and June about one-quarter of the birds were constantly broody, that is about 250 out of each 1000.

No. 17 shows the method of gates and of fastening them as described on page 34.

No. 17

No. 18

No. 19

No. 18 shows the method of watering. The water-cart is sent round as required and the water-bins filled up. This arrangement saved a great deal of labour.

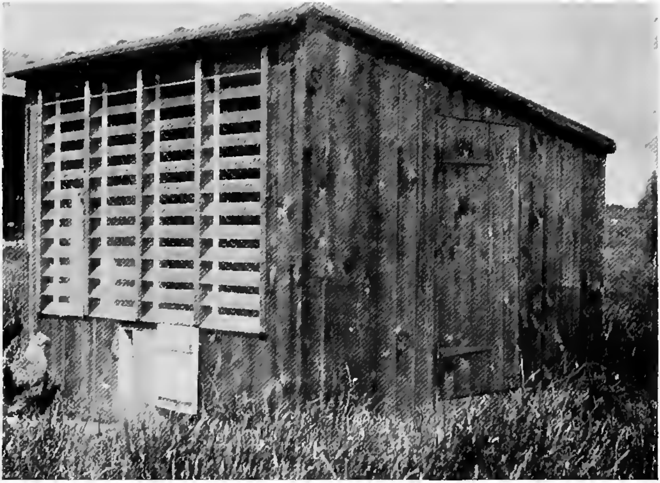
No. 19 shows the Board of Agriculture's own special house, which I have already mentioned in my hints on intensive work. This house is illustrated in one of their pamphlets. We tried this house for extensive work, that is in large grass runs, and nine other types in competition with the ordinary Sussex night ark. From the point of view of the poultry the Board's house proved excellent, though not better than the night ark, but from that of a person belonging to Group No. 7, that is of a small-holder wishing to make his or her living out of the production of eggs or table poultry on extensive lines, they are in my opinion much too luxurious and expensive; too large, require too much foundation-making, and are not sufficiently portable. Such houses, however, are useful for, and should be recommended to people in Group No. 3, as they can be used, and are very suitable, though expensive, for intensive or semi-intensive work for which night arks are not adapted.

If profit producing is a matter of indifference, then the recommendation of such houses to ordinary small-holders is laudable. But if recommended for commercial purposes, then only commercial types of houses which can be safely recommended from the point of view of an investment to be used for the wholesale production of table poultry and eggs, to be sold on the wholesale meat market, should be recommended to them. As already stated the birds did splendidly in them, and the only faults I have against them are that they are not sufficiently portable, etc., and are not as commercial a type of house for small-holders' use as the ordinary night ark, because it is possible by means of night arks under small-holding conditions to obtain equally as satisfactory housing accommodation at a great deal less cost per bird.

No matter how good houses, foods, breeds, marketing procedure, etc., may be, they should not be recommended to small-holders for commercial work if better commercial results can be obtained by them, by their using under their peculiar conditions cheaper and more remunerative appliances, ways, and means.

No. 20 shows an Ivatt house. Its novel feature is that it is fitted in front with glass louvres, it is well adapted for intensive or semi-intensive work, and well suited for people in Group No. 3.

No. 21 is a Hanson house ; this is also quite a good house very suitable for semi-intensive work.



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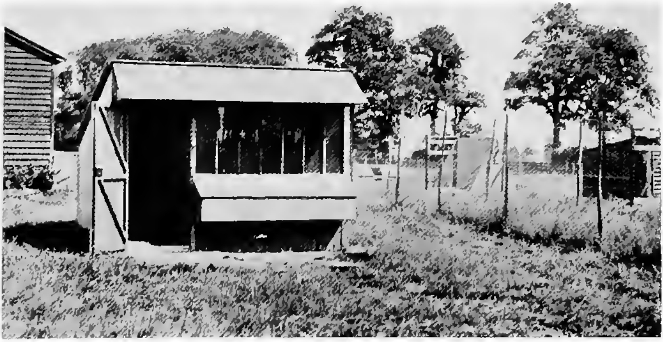

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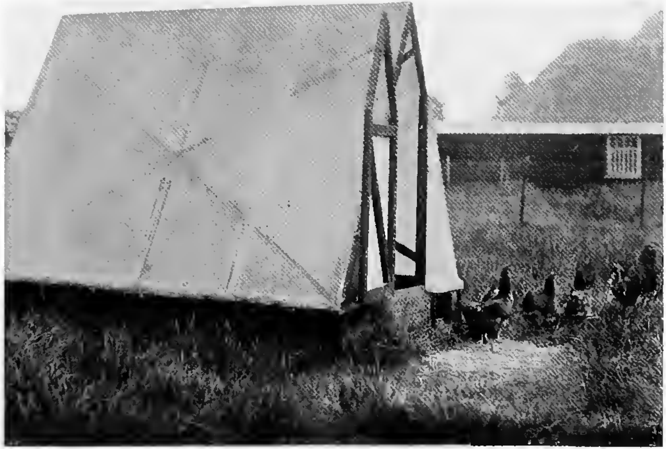

No. 22

No. 22 is a canvas house. I do not recommend canvas houses, they are not cheap because they must have a good strong substantial framework, the canvas must often be renewed, and canvas for poultry houses, so far as I can see, has no decided commercial advantage over timber.

THE PRODUCTION OF TABLE POULTRY[1]

When studying the following figures it must be remembered that feeding stuffs in 1917 cost more than double than during 1906, 1907.

In order to confirm the results obtained in 1906, and to see whether the production of poultry flesh could not be still further cheapened or simplified, and in order to have the results of two consecutive years' work on the Farne Islands, I, in May of 1907, set out on a fresh series of experiments. The year 1906 had an unusually fine, warm spring and summer. I was, therefore, fortunate in obtaining in this year an unusually wet and cold season, and as the results for both years are practically the same it proves that their favourable nature was not so much due to climatic influence as to the foods used and to the general system of feeding and management. My 1907 work consisted of three separate experiments. The first was made in order to confirm my results of 1906, and for this purpose I used a brood of nine chickens; and in order to make it of additional interest and of still greater value than that of 1906, I took this brood to twenty weeks. Their progress from the end of the sixteenth to the end of the twentieth week is very instructive and interesting. I have expressed the results by three figures. No. 1 is a life chart, or a figure of the life of the average of the nine chickens, showing their growth and progress week by week. The economic and uneconomic periods of their lives in relation to food eaten to flesh produced are clearly shown. No. 2 shows the growth of the birds up to the end of each week, and on this chart are shown, for the sake of comparison, the growth of the birds during the Farne Islands experiment of 1906. Fig. No. 3 gives the state of affairs at the Farne Islands in 1906 and 1907, from a profit-and-loss point of view, week by week. Illustrating life by this method of three charts is of the greatest importance. It is applicable not only to chickens, but to many other birds and animals—such as pigs, ducks, etc. This method of charting direct from life enables one at a glance to see exactly what is going on in the bird's or animal's system, and enables one to compare economic and uneconomic methods of feeding from both a physical and commercial point of view at the same time. Should new methods of feeding or varieties of food commend themselves, then by showing their results on three charts taken directly from the lives of the animals under experiment the advantages or disadvantages will clearly be shown. For instance, should the growth line, Fig. 2, rise, but the profit-and-loss curve, Fig. 3, fall during this period, then it is not as good; or, on the other hand, should the growth line fall, but the profit-and-loss curve rise, then it is better. The fluctuations will be brought about by the prices of the foods used and their value as flesh producers. The line C D in Fig. 1 is divided into twenty divisions, each division being one week. The distance from A to B represents the average number of ounces of food eaten per chicken; each ounce is shown by one thirty-second part of an inch. As the birds grow older naturally they eat more, and the weekly spaces representing a greater number of ounces of food eaten become larger. A C represents 1 oz. divided into sixteen parts, each part being 1 dr. Every week the number of drams of flesh left in the bird's system from each ounce of food eaten is worked out, and the result denoted by a point on the line showing the age. These points are now joined up, and this line or curve shows the growth. Every ounce of flesh eaten must necessarily produce a certain weight of flesh to pay for this food, and any margin there may be over will have to go to pay off the standing charges before leaving the farmer's profit. In my book, *How to Make Poultry Pay*, the average market value of chicken flesh was estimated to be 8d. per pound, live weight, therefore the line E F cuts off the weight of flesh which must be produced at 8d. per pound (live weight) to pay for the food eaten, which costs on an average ¾d. per pound; and, therefore, when the growth line falls below E F the flesh is being produced unprofitably; and when above profitably. The line G H represents the food during the first four weeks, the average price of which was 1d. per pound.

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[1] This Article originally appeared in *Country Life* in 1908, and is reproduced by the courtesy of the Editor, after revision by the Author.

Fig. No. 1 illustrates the average growth of the chickens week by week. Fig. No. 2 the total average growth up to the end of each week. The long top line A B gives us the food eaten, and the top line of the lower portion the average growth of the chickens during the 1907 Farne Islands experiment, and the dotted line gives the growth in 1906. The figures where the lines denoting weeks cut the growth line give us the cost of flesh per pound; this will be week by week in Fig. No. 1, and the total up to the end of each week in Fig. No. 2. By dividing the flesh portion of the week line into its total height one can ascertain in Fig. No. 1 how many pounds of food were required to make 1 lb. of flesh week by week, and by doing the same in Fig. No. 2 the total number required up to the end of each week, which is shown by the diagonal dotted lines. It will be seen that the growth of the chickens at the Farne Islands during the first twelve weeks was greater in 1907 than in 1906. At the thirteenth week the growth was equal, after the thirteenth week 1906 was just slightly better than 1907.

Fig. No. 3 is to show the position of affairs week by week from a profit-and-loss point of view. First, sufficient flesh had to be produced from the food eaten to pay for this food, and then the value of the balance of the flesh left will have to go—first, to pay off necessary charges, namely eggs and oil, carriage and salesman's charges, labour, rent, depreciation and interest on plant—before a clear profit can be declared. Week by week this balance has been worked out, and the results added together and shown by a gradually increasing curve. By referring to this figure it will be seen that at the end of the twelfth week at the Farne Islands in 1905 there was a profit of 7d., and in 1907 of 7½d. per bird. It is instructive to know which is the most profitable age at which to sell—whether at the end of the twelfth, sixteenth, or twentieth week, and at which age the flesh as formed gives the greatest margin of profit on the food consumed, and what the rate of growth at the various ages should be. In the following calculation, for the sake of comparison, I have taken it that the birds will realise one price throughout—namely 8d. per pound (live weight). In normal times in London, Manchester, and other large centres the average value of high-class birds will not be less than 10d. per lb. (live weight). In some markets a twenty-week-old pullet would be considered too old to bring the top price; but, as a general rule, one will not be far out in reckoning that any age up to twenty weeks will be classed as young fowls and bring uniform prices. The figures given show the following results. The charges include eggs, oil, carriage to market, renewals, rent, miscellaneous, and depreciation on plant. The foods cost in 1907 about 8 per cent more than in 1906:

Average weight of birds when twelve weeks old, 3 lb. 4 oz.

DEBIT

	d.		d.	
Cost of food to produce 52 oz. . .	$7\frac{11}{16}$	or	$2\frac{6}{16}$	per lb. l.w.
Cost of charges to produce 52 oz. .	$8\frac{5}{16}$	,,	$2\frac{9}{16}$	,, ,,
	16		$4\frac{15}{16}$	

CREDIT

		d.		s.	d.	
52 oz. will realise	. at	8	per lb.	2	2	
Less food and charges .	. at	$4\frac{15}{16}$	,,	1	4	
		$3\frac{1}{16}$		0	10	balance of profit.

Average weight of birds when sixteen weeks old, 4 lb. $5\frac{4}{16}$ oz.

DEBIT

	d.		d.	
Cost of food to produce $69\frac{4}{16}$ oz. .	$13\frac{1}{16}$	or	3	per lb. l.w.
Cost of charges to produce $69\frac{4}{16}$ oz. .	$9\frac{5}{16}$	or	$2\frac{2}{16}$	,, ,,
	$22\frac{6}{16}$		$5\frac{2}{16}$	

CREDIT

	d.		s.	d.	
$69\frac{4}{16}$ oz. will realise .	at 8	per lb.	2	$10\frac{10}{16}$	
Less food and charges . .	at $5\frac{2}{16}$	,,	1	$10\frac{5}{16}$	
	$2\frac{14}{16}$		1	$0\frac{5}{16}$	balance of profit.

Average weight of birds when twenty weeks old, 5 lb. $5\frac{5}{16}$ oz.

DEBIT

	d.		d.		
Cost of food to produce $85\frac{1}{16}$ oz. .	$19\frac{5}{16}$	or	$3\frac{8}{16}$	per lb.	l.w.
Cost of charges to produce $85\frac{1}{16}$ oz. .	$10\frac{5}{16}$	,,	$1\frac{15}{16}$	,,	,,
	$29\frac{10}{16}$		$5\frac{7}{16}$		

CREDIT

	d.		s.	d.	
$85\frac{1}{16}$ oz. will realise .	at 8	per lb.	3	$6\frac{8}{16}$	
Less food and charges . .	at $5\frac{7}{16}$	,,	2	$6\frac{10}{16}$	
	$2\frac{9}{16}$		0	$11\frac{14}{16}$	balance of profit.

Therefore, had the birds been sold when twelve weeks old there would have been a profit of $3\frac{1}{16}$d. per pound (live weight) or 10d. per bird. Had the birds been sold when sixteen weeks old there would have been a profit of $2\frac{14}{16}$d. per pound (live weight) or 1s. $0\frac{5}{16}$d. per bird. Had the birds been sold when twenty weeks old there would have been a profit of $2\frac{9}{16}$d. per pound (live weight) or $11\frac{14}{16}$d. per bird. At the end of the twentieth week, in order to cover the extra labour, carriage and commission charges, 1d. extra has been added, and in the case of the twelve-week old chicken, to compensate for the smaller charges, 1d. has been deducted. In these calculations the value of the flesh of the chicks when hatched is of course included. The above table gives the figures referring to the Farne Islands experiment in 1907. By reference to them the three diagrams will be readily followed and understood.

High-class table birds of a uniform weight and quality—taking the season through—will average in London, Manchester, and other large centres in normal times not less than 10d. per lb. (live weight).

THE END

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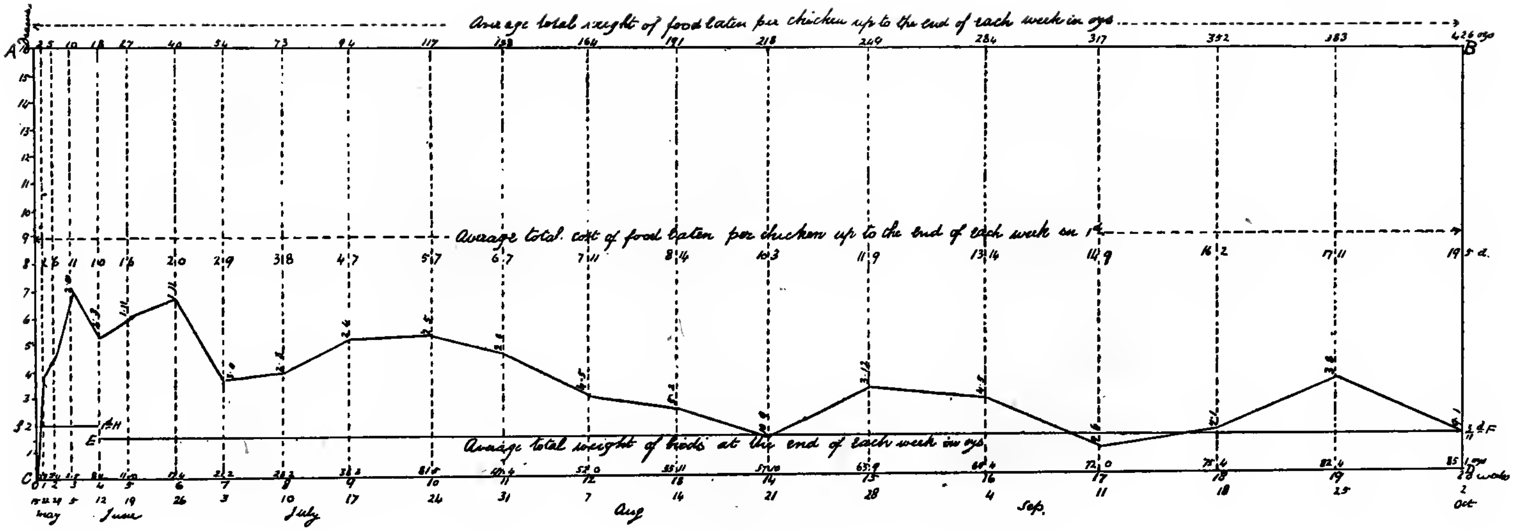

Average total weight of food eaten per chicken up to the end of each week in ozs
2.5 5 10 18 27 40 54 73 94 117 138 164 191 218 249 284 317 352 383 426 ozs
A
B
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Average total cost of food eaten per chicken up to the end of each week in 1d.
2.0 10 1/6 2/0 2/9 3/18 4/7 5/7 6/7 7/11 8/4 10/3 11/9 13/4 14/9 16/2 17/11 19/5 d.
3 2
1½ H
E
F
Average total weight of birds at the end of each week in ozs
52 0 55 11 57 10 65 9 69 4 72 0 75 4 82 4 85 1
C
D
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 weeks
15 22 29 5 12 19 26 3 10 17 24 31 7 14 21 28 4 11 18 25 2
May
June
July
Aug
Sep.
Oct

FIG. 1.

FIGURES RELATING TO THE FARNE ISLANDS EXPERIMENT IN 1907, WHICH CONTAINED NINE CHICKENS

Number of weeks old.	Average weight of Chickens.	Increase of weight per Chicken.	Value of increased weight at 8d. lb. l. w.	Cost of food eaten per bird per week.	Margin left for profit after the food eaten has been paid for.	Total margin left to represent profit.	Total weight of food eaten by the whole brood.		
							Oatmeal 1¾d. per lb.	Chicken meal $\frac{11}{16}$d. per lb.	Chicken corn ¾d. per lb.
	oz. dr.	oz. dr.	d. $\frac{1}{16}$	d. $\frac{1}{16}$	d. $\frac{1}{16}$	d. $\frac{1}{16}$	lb. oz.	lb. oz.	lb. oz.
0	1 7	1 7	0 11	..	..	..	..	..	..
1	2 3	0 12	0 6	0 2	+ 0 4	0 4	0 8	0 11	..
2	3 11	1 8	0 12	0 4	+ 0 8	0 12	1 11	0 11	..
3	5 5	1 10	0 13	0 5	+ 0 8	1 4	0 10	1 13	0 12
4	8 1	2 12	1 6	0 5	+ 1 1	2 5	..	2 2	2 5
5	11 10	3 9	1 12	0 6	+ 1 6	3 11	..	1 13	3 5
6	17 3	5 9	2 13	0 0	+ 2 3	5 14	..	3 8	4 4
7	21 1	3 14	1 15	0 11	+ 1 4	7 2	..	3 13	4 15
8	26 1	5 0	2 8	0 13	+ 1 11	8 13	..	5 0	5 5
9	34 3	8 2	4 1	0 15	+ 3 2	11 15	..	5 13	6 3
10	41 5	7 2	3 9	1 0	+ 2 9	14 8	..	5 12	7 2
11	47 4	5 15	2 15	1 0	+ 1 15	16 7	..	5 7	6 11
12	52 0	4 12	2 6	1 4	+ 1 2	17 9	..	5 11	6 11
13	55 11	3 11	1 14	1 3	+ 0 11	18 4	..	5 6	8 8
14	57 0	1 5	0 11	1 5	− 0 10	17 10	..	8 8	6 13
15	63 9	6 9	3 5	1 6	+ 1 15	19 9	..	10 8	7 2
16	69 4	5 11	2 14	1 8	+ 1 6	20 15	..	12 8	7 0
17	72 0	2 12	1 6	1 8	− 0 1	20 13	..	11 0	8 0
18	75 5	3 5	1 10	1 9	+ 0 1	20 14	..	12 0	8 0
19	82 4	6 15	3 7	1 9	+ 1 14	22 12	..	12 0	8 5
20	85 1	2 13	1 6	1 10	− 0 4	22 8	..	13 0	8 8
		85 1	42 8	19 5	22 8	22 8	2 13	127 0	109 13

	d.
Margin left for profit . . .	22$\frac{8}{16}$d.
Food	19$\frac{5}{16}$
Chickens when hatched . . .	$\frac{11}{16}$
	42$\frac{8}{16}$d.

All the above chickens were reared. The following quantity of food was eaten. The above experiment started on May 15, and ended on October 2.

		s. *d.*
2$\frac{13}{16}$ lb. oatmeal	0 st 2$\frac{13}{16}$ lb. at 1s. 8d.	0 4
127 lb. plain meal	9 st. 11 lb. at 9½d.	7 2½
109$\frac{13}{16}$ lb. chicken corn	7 st. 11$\frac{13}{16}$ lb. at 10½d.	6 10½
239$\frac{10}{16}$ lb.		14 5

No meat or biscuit was used and the foods were therefore of the cheapest possible character.

SOME FACTS REFERRING TO THE FARNE ISLANDS EXPERIMENT

Average weight of food eaten per bird	26 lb. 9 oz.
Average weight of birds at end of experiment	5 lb. 5 oz.
Average cost of food eaten per bird	1s. 7$\frac{5}{16}$d.
Average cost of flesh per pound for food	3½d.
Average cost of food eaten during the first four weeks . . per lb.	1d.
Average cost of food eaten during the last sixteen weeks	1s. 6$\frac{5}{16}$d.

54½ per cent of the food eaten was soft and 45½ per cent hard.

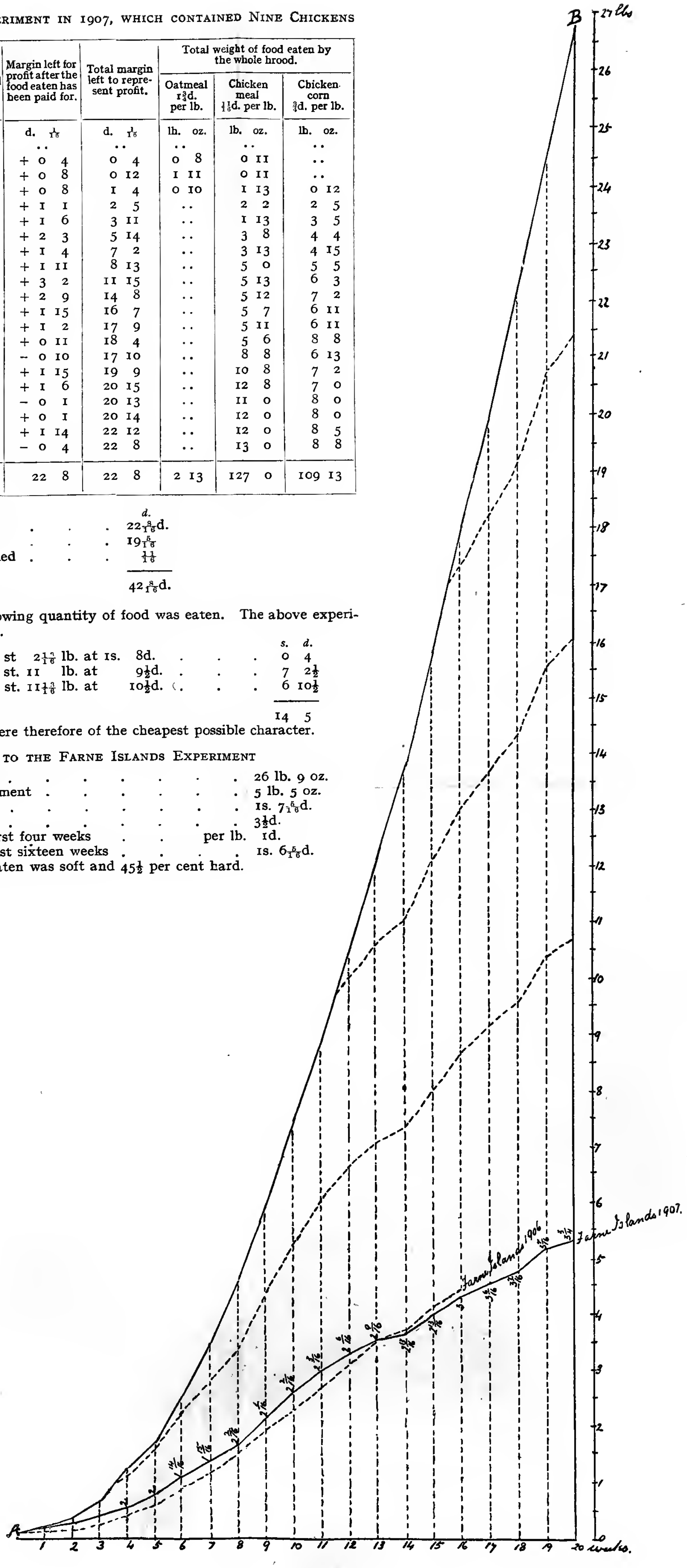
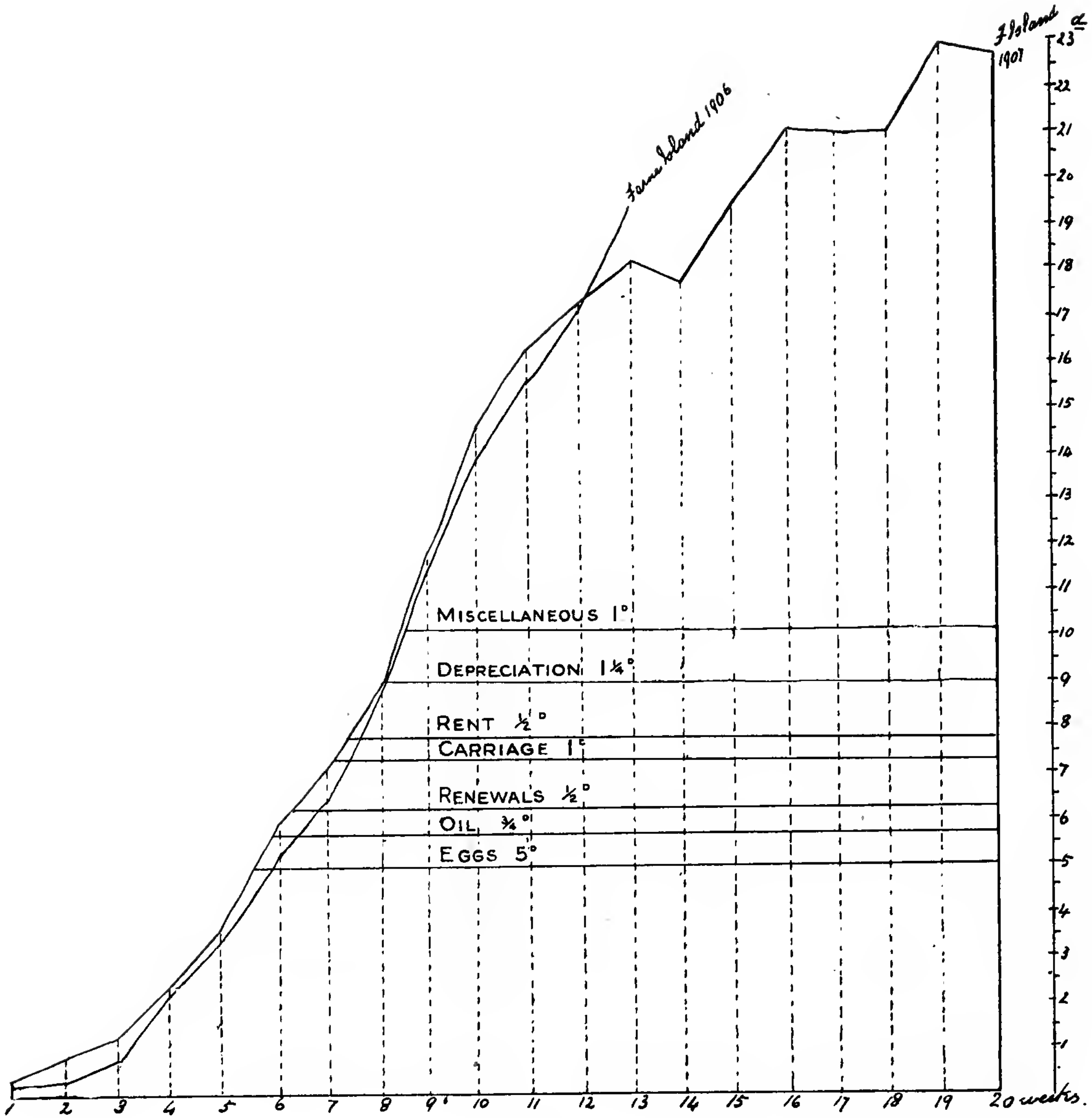


FIG. 2.


Farne Island 1906
F Island 1907
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22
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7
6
5
4
3
2
1
Miscellaneous 1d
Depreciation 1¼d
Rent ½d
Carriage 1d
Renewals ½d
Oil ¾d
Eggs 5d
1
2
3
4
5
6
7
8
9
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13
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16
17
18
19
20 weeks.

Fig. 3.

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